DOCUMENT RESUME

ED 242 273 HE 017 143

AUTHOR	Musgrave, Gerald L.
TITLE	Potential Impact of Increased Numbers of Physicians upon Physician Behavior, Access to, and Cost of, Medical Care. Final Report.
INSTITUTION	Policy Analysis, Inc., Ann Arbor, MI.
SPONS AGENCY	Health Resources Administration (DHHS/PHS), Hyattsville, Md. Div. of Medicine.
PUB DATE	[84]
CONTRACT	HRA-232-82-0023
NOTE	330p.; For the Executive Summary of this report, see HE 017 142.
PUB TYPE	Reports - Evaluative/Feasibility (142)
EDRS PRICE	MF01/PC14 Plus Postage.
DESCRIPTORS	*Costs; *Dentists; Economic Factors; Expenditures; Higher Education; Hospitals; *Labor Supply; Medical Schools; *Medical Services; Models; *Physicians; *Prediction
IDENTIFIERS	United States

ABSTRACT

The potential impact of the increasing supply of physicians on physician behavior, the cost of medical services, and access to services is addressed in detail in this final research report. Econometric modeling and analyses of economic activity within the health sector were undertaken. An eight equation model of the hospital and physician sectors was developed, based on supply and demand principles. Forecasts are presented regarding: cost of physician and hospital services, total expenditures on hospital and physician services, real private insurance expenditures and government expenditures on these services, third party reimbursements, and out-of-pocket expenditures. It is suggested that in response to the increasing numbers of physicians, practicing physicians, hospitals, and third-party payers will compete. Attention is directed to forms of competition, likely approaches to reduce competition, and pricing behavior. The structure of the health care industry and the impact of physician behaviors (economic, political, competitive actions) on access to health care are covered. Concepts pertaining to access to health care are discussed, including allocative and technical efficiency and inflation effect. Finally, market imperfections and market failures are discussed. A bibliography is included and a technical appendix considers overall estimation results. (SW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

HE

ED242273

FINAL REPORT

Deliverable Item 5

Potential Impact of Increased Numbers of Physicians Upon Physician Behavior, Access to and Cost of Medical Care

Contract No. HRA-232-82-0023

Contractor

Policy Analysis, Inc.
343 Church Street
Ann Arbor, Michigan 48104

Gerald L. Musgrave, Ph.D.

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

[illegible]

[illegible]
[illegible]
Bureau of Health Professions
[illegible]
[illegible]

[illegible]

HE 017 143

Acknowledgements

A large number of individuals contribute to completing a project of this nature. Ms. Helen McCarron, the government Project Officer, provided continuous assistance throughout the period of performance both in her official role and her helping us to keep abreast of the developing policy issues of concern to the subject of our work. Jesse S. Hixson, Chief of Modeling and Research for the Bureau of Health Professions and director of the Time Series Modeling Project which developed the original versions of the econometric model that we adapted and extended for the current project, provided invaluable technical assistance throughout the contract as well as the full cooperation of his staff.

In Ann Arbor, Paul Feldstein provided continuing comment on the research throughout the project. Jan Kmenta was an invaluable consultant on econometric estimation procedures. I am indebted to the project staff--Samie Rehman, Mary Ann Buchanan, Mark Finley, Jan Musgrave and Grace Waterbury--for their loyal support. In the end, however, I bear full responsibility for the content and quality of the report.

Table of Contents

Acknowledgements ii

1.0 INTRODUCTION 1

- 1.0 Scope and Purpose of Study 1
- 1.1 Methodology 2
- 1.2 Modeling Assumptions 7
- 1.3 Private Sector Demand 10
  - 1.3.1 Symmetry of Demand Specification . . . 12
- 1.4 Government Expenditure Functions 13
- 1.5 Supply of Hospital Services 16
- 1.6 Supply of Physician Services 19
- 1.7 Equilibrium in Hospital and Physician Markets 22
- 1.8 Compilation of Findings 25
  - 1.8.0 Introduction. 25
  - 1.8.1 Findings Concerning Cost. 27
  - 1.8.2 Findings Concerning Physician Behavior. 30
  - 1.8.3 Findings Concerning Access to to Health Care. 32

2.0 THE IMPACT OF THE PROJECTED PHYSICIAN SURPLUS ON THE COST OF HEALTH CARE 38

- 2.0 Introduction 38
- 2.1 Competition 38
- 2.2 Misnomer of Physician "Surplus" 41
- 2.3 Alternative Cost Concepts 44
- 2.4 Research Findings 47
  - 2.4.1 Overview 47
  - 2.4.2 Cost of Physician Services 50
  - 2.4.3 Cost of Hospital Services 54
  - 2.4.4 Total Hospital Services Expenditures. . 58
  - 2.4.5 Total Physician Services Expenditures . 60
  - 2.4.6 Total Health Expenditures as a Percent of Disposable Income 62
  - 2.4.7 Real Private Insurance Expenditures on Hospital Services 69
  - 2.4.8 Real Private Insurance Expenditures on Physician Services 72
  - 2.4.9 Real Government Expenditures on Hospital Services 77

4

2.4.10 Real Government Expenditures on Physician Services 79
2.4.11 Real Third Party Expenditures on Hospital Services 82
2.4.12 Real Third Party Expenditures on Physician Services 84
2.4.13 Real Direct or Out-Of-Pocket Expenditures on Hospital Services 86
2.4.14 Real Direct or Out-Of-Pocket Expenditures on Physician Services . . . 90

3.0 PHYSICIAN BEHAVIOR IN RESPONSE TO THE PROJECTED INCREASE IN NUMBERS OF PHYSICIANS 93

3.0 Introduction 93
3.1 Pricing Behavior 93
3.2 Forms of Competition 99
3.3 Attempts to Reduce Competition 104
3.4 Behavior and Competition 108

4.0 PHYSICIAN SURPLUS AND ACCESS TO MEDICAL CARE . . . 111

4.0 Introduction 111
4.1 General Definition of Access to Health Care 112
4.2 Financial Access 116

4.2.1 Price Indicies 116
4.2.2 Insurance 120
4.2.3 Governmental Expenditures 125
4.2.4 Total Third Party Expenditures 130
4.2.5 Direct or Out-Of-Pocket Expenditures . 133

4.3 Functional Access to Health Care 138

4.3.0 Introduction 138
4.3.1 An Econometric Model of Primary Care Physician Location 141
4.3.2 Forecasts to 1990 144
4.3.3 Summary 155

5.0 ANALYSIS OF THE POTENTIAL IMPACT OF THE PHYSICIAN SURPLUS UPON THE SYMBIOTIC RELATIONSHIP OF PHYSICIAN BEHAVIOR, ACCESS TO, AND COST OF MEDICAL CARE 157

5.1 Structural Relations 157
5.2 Behavioral Relations 171

5.2.1 Introduction 171
5.2.2 Anti-competitive Behavior 173
5.2.3 Pro-competitive Behavior 178

5.3 Performance Relations 188

5.3.1 Introduction 188
5.3.2 Allocation Efficiency 190
5.3.3 Technical Efficiency 192
5.3.4 Inflation Effect 195
5.3.5 Technological Progress and Equity. . . 196

A.0 TECHNICAL APPENDIX 198

A.1 Model Specifications 198
A.2 Discussion of Overall Estimation Results. . . . 199

A.2.0 Demand for Private Physician Insurance . 199
A.2.1 Privately Insured Physician Services . . 201
A.2.2 Private Insured Hospital Services . . . 206
A.2.3 Supply of Physician Services 212
A.2.4 Supply of Hospital Services 219
A.2.5 Government Expenditures for Hospital Services 227
A.2.6 Government Expenditures for Physician Services 235
A.2.7 Direct Physician Payments 239
A.2.8 Direct Expenses for Hospital Services. . 249

B.0 BIBLIOGRAPHY 257

B.1 Legend 277
B.2 Data Definitions and Sources 278

C.0 MARKET IMPERFECTIONS AND MARKET FAILURES IN THE CONTEXT OF CHANGES IN PHYSICIAN SUPPLY 287

C.0 Introduction 287
C.1 Market Imperfections 287
C.2 Market Failure 295
C.3 Redistribution Using In-Kind Subsidies 304

1.0 INTRODUCTION

1.0 Scope and Purpose of Study

The purpose of the research effort described in this report was to forecast the consequences of the growth in the numbers of physicians practicing in the United States that has been projected for the 1980's and beyond. The implications of the projected growth of the national physician stock has been the subject of intense debate for some time. Among economists, a number of competing hypotheses have emerged to explain and predict the behavior of the physician services market. Recently, the debate intensified following the pronouncement of a government-sponsored commission (The Graduate Medical Education National Advisory Committee, 1980) that the nation will experience an increasing "surplus" of physicians in the future unless direct action is taken to reduce medical school enrollment. In 1982, the U.S. Health Resources Administration, which administers the health manpower legislation through its Bureau of Health Professions issued a Request for Proposals for this current study. The study was to analyse the potential impact of the increasing supply of physicians on physician behavior, access to and the cost of medical care, and a number of other factors. This report is the result of that study.

1.1 Methodology

The proposed analytic approach accepted by the Health Resources Administration for the study focused on the interrelatedness of the factors of interest. It emphasized that the impact of the increasing stock of physicians on each particular variable of interest cannot be assessed independently of the impacts on the remaining variables which in turn affect all the other variables. From the formal modeling standpoint, explicit recognition of the interrelatedness of the variables of interest requires a simultaneous equation approach to developing a forecasting model to predict the responses of the physician service market to the projected growth in the numbers of physicians. Furthermore, the behavior of physicians and the changes in the physician service market cannot be considered in isolation from other sectors of the health system. Interdependencies among the various markets within the entire system must also be considered both to understand and predict changes in the physician service sector. In particular, changes in the hospital industry will undoubtedly have profound effects on the way physicians behave and deliver medical services, and conversely, so that the forecasting model must consider the simultaneous relationships between the physician and hospital markets.

The development of a simultaneous equation system for forecasting the impact of the expanding physician supply would have been beyond the scope of the resources available for the proposed study if considerable work had not already been done. The approach proposed for the study was to build on previous modeling work of Health Resources Administration staff who were investigating the applicability of orthodox economic concepts to the medical care industry by developing and testing econometric models of supply and demand for various health services and types of health manpower. The HRSA staff effort, known as the Time Series Modeling Project, had developed a number of models for specific purposes. At the time that the current project began, the models available consisted of two main modules based on aggregate time series data, and five subsidiary modules which forecast some of the exogenous variables for the two main modules. The two main modules were:

I. A four-equation model of the physician and hospital service market

II. A three-equation model of the dental service market

Early versions of modules I and II are described in "The Aggregate Supplies and Demands of Physician and Dental Services," by Jesse S. Hixson and Nina Mocniak published in the Target Income Hypothesis and Related Issues in Health Manpower Policy, DHEW Publication No. (HRA) 80-27. The endogenous variables of module I were prices and aggregate real expenditures on physician and hospital services; those of module II were prices and aggregate real expenditures on dental services.

The five subsidiary modules are:

A. A three-equation model of annual Registered Nurse Graduates

B. A stock-adjustment model of the annual number of short term general hospital beds

C. A stock-adjustment model of annual dental school enrollment

D. A stock-adjustment model of annual medical school enrollment

E. A disequilibrium model of the geographic diffusion of new additions to the stocks of physicians and dentists.

Module A is based on aggregate time series data. Modules B,C, and D are based on pooled annual state data for a period of time extending from the mid 50's. Modules C and D contain some consideration of interstate migration of practitioners, but without controlled totals. The output of modules C and D are input into a birth-death process model to calculate the total annual stocks of physicians and dentists which in turn are exogenous variables in the main modules. The output of modules A and B are input directly into the main modules as exogenous vairables. Module E is based on county data over the years 1975-79. Module E has not been used in conjunction with any of the other modules.

It was proposed to expand Module I, which was a simultaneous equation model of the physician and hospital service markets, to take into account a number of explicit considerations of interest to the government with respect to the expanding supply of physicians. A number of exogenous variables in Module I as it existed at the time were to be endogenized, and certain disaggregations within the overall simultaneous equation framework were proposed. The proposed expansion of Module I would yield information about the structure, conduct, and performance of the industry which would in turn afford inferences regarding the effect of physician supply on their competitive reaction, their pricing and supply behavior, and the effect of anticipated exogenous changes and developments in the hospital industry on the physician services market. The model would yield direct estimates of the impact of the expanding supply of physicians on medical care prices and expenditures, and on the compostition of expenditures by sources of payment (i.e., private third-party, out-of-pocket, and government). The geographic dimension of the access issue was to be approached through Module E, which was being applied by the HRSA staff for research into the geographic diffusion of physicians and dentists.

At issue in any project aimed at policy analysis is the trade-off between the amount of detail that is desired and the amount of data available to develop the empirical basis of the analysis. Because the major theme of the current project was the interrelatedness of the variables that are impacted by the expanding physician stock and the mutual dependencies between the physician and hospital sectors of the health care industry, the decision was made not to add detail to the model that required a departure from the full simultaniety of the estimation of its structural relationships. The result is that the expanded module I continues to be based on national time series data and that quantitative conclusions about the future effects of the expanding supply of physicians are expressed in aggregate terms (except for the forecast of geographic dispersion from module E which is based on county level data). Nevertheless, because the estimated structural relationships exhibit characteristics consistent with orthodox theoretical expectations, much can be inferred from the model about the qualitative properties of the industry's structure and micro economic behavior consistent with it.

A technical description of the simultaneous equation model that was developed and used for the analysis and forecasts in this project is provided in the Technical Appendix. Similar descriptions of the auxiliary modules (modules A-E) are available from the Modeling and Research Branch where they were developed. The remainder of this section contains a non-technical discussion of the completed model.

1.2 Modeling Assumptions

The fundamental modeling assumption is that conventional economic and econometric analysis can be used to model the health care industry. Specific account has been taken of the special aspects of the health care industry, for example the third party domination of the reimbursement system. However, the assumption that economics applies to physicians as it does to lawyers, accountants or airline pilots is used throughout the model. We also assumed that conventional economics applies to the relation between professionals in the health care services industry as it does to lawyers in the legal services industry, accountants in the accounting services industry and pilots in the airline transportation industry. Each industry has its own special considerations, however one consistent framework is assumed to be applicable. This is the economic equivalent of assuming one set of physical principles applies on every planet and we do not need to begin with the proposition that we must have special science of physics for each planet or star.

The model is developed utilizing conventional supply and demand analysis. In the model we assume the conflicting pressures of supply and demand will be resolved with the adjustment of prices and adjusted service levels over time. When outside forces cause disequilibrium to occur, this "instability" is resolved through the interaction of patients, providers, government institutions and private health insurance firms.

It is well known that many economic and other forces produce market imperfections. Other institutional factors have the potential to influence our results adversely. If our model produces statistical results at odds with our assumptions, we would have to reevaluate our formulation. In addition, we consider the forecasting behavior of the model when considering the appropriateness of our preliminary specifications. We do not believe that a discussion of the validity of the assumptions are inconsequential, but rather it is the fact that the model's ability to explain the changes in economic activity is a more crucial and fruitful criterion for evaluation.

The final modeling assumption concerns the expected future paths of exogenous variables. Every model has variables that are determined by the model, and variables that are outside the scope of the model. Real income is an example of a variable or economic influence that this health care model does not explain. Prices of physician services is a variable or economic result that the model attempts to explain and forecast. The variables explained in the model are called endogenous variables and variables outside the scope of the model are called exogenous variables. To forecast the future values of the endogenous variables we need future values for the exogenous variables. This is a requirement for all econometric models.

We used three general procedures for obtaining the predicted values for the exogenous variables. The first procedure is to use the forecast from another model as an input to this model. We only used models that were appropriate for this purpose and ones that were "open". "Open" in the sense that outside independent scholars had access to the models and they were not black boxes. The second procedure was to adopt projections or forecasts from HRSA or other governmental agencies. Our third method was to use a time trend or constant values for the exogenous variable in those cases where the first two approaches were not available. The data section contains a detailed discussion of the methods used to obtain these assumed values for the exogenous variables.

These assumptions are customarily used in modeling. However, explicit accounts or notice of the process and possible issues are not always made clear. By specifically noting these assumptions and complications does not make this approach less general. Actually, other approaches such as trending, expert systems, operations research or systems dynamics have much more stringent assumptions. However, the people using them are not usually aware of the long and detailed lists of assumptions that would be necessary before those techniques would be valid in the context of the circumstances faced by this model.

1.3 Private Sector Demand

Families base their health care decisions on their expected level of physician and hospital expenditures. When they plan their health expenditures they choose between out-of-pocket (both uninsured and co-pay plus deductible) and insured expenditures. The individual family, of course, attempts to maximize its well being. In this regard, expected total health care costs over the planning horizon are minimized. In this regard, people will choose various government programs, if they meet eligibility requirements, and if the program offers lower net cost (holding quality of services constant). This assumption allows us to model the changing levels of participation in governmental health programs. The model identified a change in the distribution of expenditure services paid by private insurance and direct payments into government financed or subsidized programs.

The real cost of interest to the individual is, of course, the after tax expected cost of health expenditures. Because employees and their families can receive tax free wage income in the form of health insurance or health benefits, they prefer to have them paid by their employer. This special tax treatment of health expenditures contributes to the explanation of why most health insurance is purchased by employers as "agents" for their employees and little if any auto or home insurance is purchased this way. This special tax treatment of insurance and health benefits is, in effect, a subsidy that promotes the consumption of health services in our model.

Our model assumes that employers, as business firms, seek to maximize profits, and other organizations seek to minimize cost for a given level of output. Firms can deduct health care costs as a business expense, and they act as if they know it would cost them an additional $143 to pay an employee an additional $100 in insurance benefits if the worker is in the 30 percent marginal tax bracket. Nonprofit and governmental organizations have the same incentives because it reduces the individual organization's budget requirements. It should be noted that this last assumption is not critical to the model. Also, at the National level these pressures may be substantially reduced. Nevertheless, these pressures are certainly operative in the private, nonprofit and state government level.

1.3.1 Symmetry of Demand Specification

This formulation would lead to the same functional form and explanatory variable specification for the demand for insured expenses and direct or out-of-pocket expenses. Simply stated, we have the same right-hand side variables for the disaggregated demand functions in the public sector. This is an especially strong specification and places heavy pressures on the basic economic analysis to be incorporated into the model. This is the intellectual opposite of the hypothetical "kitchen sink" model where every variable that could possibly have an impact is tossed into a regression equation. Future work will undoubtedly relax this constraint. However, we have made considerable progress with this careful specification and its power should be carefully considered.

To economize on exposition, detailed discussion of the particular variables and their economic interpretation is presented in the appendix on model results. At this point we simply list the exogenous variables and refer the interested reader to the appendix for a discussion of their utilization in the model.

- Own price
- Lagged own price
- Cross price
- Percent of expenditures insured
- Population
- Unemployment rate
- Medicare-medicaid
- Marginal tax rate
- Real disposable income

1.4 Government Expenditure Functions

The private sector economic decisions of individuals have an important impact in this sector. In addition, the public choice mechanisms connected with the large scale government activities in health care are also operative. Our model is based on the combined influence of the private decision making and the governmental regulatory and enforcement impacts.

In most cases private decisions are based on the fundamental forces that influence the governmental decision process. As we developed the model we discovered that more elaborate specifications of the governmental decision process moved us away from our primary focus. That focus is to develop a model that is consistent with economic theory, amenable to estimation with state of the art techniques, and produces reasonable forecasts of the impact of the changing physician sector within the sample period. In particular, our hypotheses would have been based on exogenous variables that would have been difficult or impossible to project. These formulations may have satisfied some of our objectives, but it would not be possible to adequately forecast outside the sample. We could have selected other research strategies, such as extensive sensitivity analyses of the results as subject to political or administrative decisions. Results generated by this approach would have been subject to considerably more speculation than results based on the methodology we adopted.

The major Federal government programs are Medicare and Medicaid. These programs are targeted to provide in-kind transfers of health services to the eligible aged or poor population. Our model specifies two impacts of these and all other governmental health service expenditures. The first is a stimulative effect that is similar to the effect we would see if these groups received cash grants or increases in income. The second effect is the possible substitution of government expenditures for private insurance and private out-of-pocket expenditures. Our disaggregation allows us to test the hypothesis that Medicare and Medicaid have reduced reliance on private market health care expenditures.

Our model also anticipates that macro economic activity or the business cycle would influence governmental expenditures. One hypothesis is that people who are unemployed for a sufficiently long period lose their in-kind wage payments in health services. This effect would cause a reduction in health services in periods of long-term or deep recession. The alternative hypothesis is that individuals find alternative employment within the policy grace period, continue their health coverage from savings, or purchase health services directly. With the high level of two employee households, it may be that spouse coverage is switched from one carrier to another. In a national time-series, a number of possibilities existed and the model was developed to be as flexible in this regard as was practical.

It might be noted that real disposable income has two possible impacts. First, higher levels of disposable income are consistent with higher levels of governmental revenues - ceteris paribus. This would promote easing of various administrative regulations and eligibility for the programs. In addition, the establishment of new programs would be consistent with this formulation. This income variable would also be a proxy measure for the counter cyclical or built-in stabilizing effect the programs may have. Higher levels of unemployment or lower levels of disposable income would increase governmental expenditures — holding eligibility standards constant. These two forces work in opposite directions and the net impact is measured in the model.

The variables included in the government expenditures equations are listed below. In this formulation we have again adopted the strong assumption that the same fundamental economic forces influence hospital and physician services. As before, this places emphasis on the economic analysis and allows little chance for ad hoc curve fitting. The exogenous variables are:

- Real disposable income
- Population over 65 years
- Population under 65 years
- Own price
- Lagged own price
- Unemployment rate
- Medicare-Medicaid

1.5 Supply of Hospital Services

The supply side of the model posits one supply equation for hospital services and a separate supply equation for physician services. Hospital services are supplied by a heterogeneous group of organizations and their diversity is recognized. However, at the national level, the overriding economic forces influencing all hospitals are the ones that are assumed to be dominant in all hospital activities. Each organization is assumed to minimize the expected cost of producing a given expected quantity of services. This formulation is consistent with not-for-profit and other governmentally funded or subsidized operations. It is also consistent with the growing numbers of and growing market share of for-profit or proprietary institutions.

Supply of hospital services in the national time-series model is derived from the marginal cost schedules of the various hospitals. These long run marginal cost schedules are, in effect, aggregated at the various hospital price index levels to obtain the national supply function. Because this model was developed for long run (5 to 10 years) forecasting, the appropriate function is the long run industry supply function.

Hospitals are assumed to receive a major portion of their revenues from third parties. The rates are assumed to be established on cost based reimbursement systems. Lagged prices would serve the same economic purpose as current prices in other econometric models. Current prices are a proxy for current costs. As costs increase, these organizations would have to reduce their level of output or other service related characteristics in response to increases in costs (holding all other influences constant). Because of the reimbursement systems, current prices are assumed to be an outstanding proxy for current costs. We also hypothesize that labor costs for nursing personnel can be statistically separated from the other costs in our hospital supply equation. The general cost variable and the nurse labor expenditure variable are hypothesized to comprise a satisfactory representation of relevant costs at the national level.

It should be remembered that price controls were established from August 1971 to April 1974 by the Economic Stabilization Act. Our model includes a binary variable for this policy. The model is based on the assumption that the Economic Stabilization Program did not produce any fundamental structural changes to the hospital sector after the program was terminated.

However, other structural changes have probably been occurring. One notable change is the intensity of service and/or changes in the case mix in hospitals over time. This change in the industry is one of the most complex factors to model. Change in long-term beds is certainly one industry response to the changing mix of patient problems. Our use of this variable is purely as a control variable. The control it serves is to reduce the impact of all changes in the service characteristic vector or possible hedonic service components. Because of this, the magnitude and direction of its influence is not determined by the model. In effect, it combines influences that increase as well as decrease costs.

One industry supply response to changes in economic conditions is to increase or decrease the stock of short-term hospital beds. In our model, the long-term bed influence is held constant. Increases in favorable economic conditions connected with hospital operations are met by increases in the stock of short-term beds. This can be the result of government or third party systems that promote more beds or increases in other economic conditions inflencing hospitals. Its economic result is analogous to the increase in the number of firms, increase in the number of plants, or the increase in numbers of operating facilities in orthodox economic analysis. The interpretation of this variable is the same as entry by new or expansion of additional plants by existing firms where net revenues exceed all net costs including opportunity costs.

1.6 Supply of Physician Services

As in the hospital equation, physician services supply is modeled as one equation in the system of simultaneous equations. The following variables are included in the equation:

- Own price
- Lagged own price
- Technological change
- Number of physicians
- Economic Stabilization Program
- Nurse graduates lagged

The price index for physician services has the same purpose in this equation as the hospital price index has in the hospital equation. "Prices", although to a smaller extent, are also based on a lagged or retrospective cost. The usual, customary and reasonable provisions of third party reimbursement systems have a well-known lag structure. Current prices also serve the same function as representing current practice costs of operation.

The Economic Stabilization Program was also applicable to physician services. The model uses a binary variable for this temporary change in the industry structure. Long run changes in the industry structure can also be anticipated. Technology was modeled as an influence on the productivity of physicians. Changes in technology, whether capital using or labor saving, were included in the model. Labor costs of other health providers were also included in the model. These would be based on the concept that the production of physician services would be augmented by additional cooperating inputs or alternatively their wage rates would be a separate identifiable cost in the marginal cost function.

One of the central elements of the model is the impact of the growing stock of physicians. The total number of physicians is used in preference to practicing or full-time or active physicians because these other measures are endogenous variables in a correctly specified model. Stated differently, economic conditions influence the work activities of physicians and the decision to remain in practice. These conditions and other economic decisions would be intertwined within the model, not outside of it. However, the total number of physicians is a capacity variable that is based on decisions made at least seven to ten years ago. It is much less sensitive to current economic conditions than numbers of practicing physicians.

A second point is that we resisted the temptation to introduce a physician supply variable into all equations of the system. It might be argued that the number of physicians belongs in the hospital supply equation. We found that argument unpersuasive. If we were to have taken that approach, we would have used physician wage data in the reduced form cost function as developed by Shephard and Uzawa. The simultaneous relations that our model incorporates are the relations between the physician sector and the hospital sector. We also note that our limited number of annual observations limits our ability to enter all the possible combinations of variables and interactions among variables. For these reasons we have, in fact, accounted for the interrelations between the physician sector and the hospital sector, and not confounded the hospital bed model.

1.7 Equilibrium in Hospital and Physician Markets

The three separate demands in the hospital services sector are aggregated to form total hospital services demand. In equilibrium total hospital service demand is equal to total hospital services supply. Total physician services demand is modeled in the same way. Equilibrium in the physician services sector is achieved when total supply equals total demand. The system of supply and demand equations is solved simultaneously. This means that both the hospital and the physician sectors interact at each sample point. This is in contrast to the situation where all demands are aggregated to form one aggregate demand for total health care and one aggregate supply is postulated. We preserved the interactions between sectors when estimating the parameters of all eight equations simultaneously.

Econometricians will note that we estimated the parameters using three-stage least squares. We eliminated all identities in the system, by algebraic substitution, prior to estimation. Private insured expenditures being the most market related category were specified as in a conventional demand model. Government expenditures are equal to third party expenditures minus private insured expenditures. The governmental expenditures equations have third party expenditures as the left hand side variable and private insured expenditures as an included endogenous variable. In a correctly specified model, the coefficient for this control variable would be unity. However, in a simultaneous model of this nature, this often proves to be a difficult task to achieve. Our results were surprisingly successful in this regard.

Out-of-pocket or direct expenditures are definitionally equal to total expenditures minus all third party expenditures. Total expenditures is the dependent variable and third party expenditures is an included endogenous variable. Its expected coefficient value is one. We were again successful in achieving this result. In effect, we made out-of-pocket expenses a residual. Researchers familiar with these data will also know that out-of-pocket expenditures are computed as a residual in the original source data.

A related technical note concerns the final solution form of the model. Three-stage least squares begins with two-stage least square estimates in the same way as two-stage beings with ordinary least squares estimates.

Our three-stage least squares simply adds a dimension to the simultaneity. The added dimension is the relation between each of the structurally related equations. If the equations were independent, the three-stage least squares technique would not alter our parameter estimates from those obtained in two-stage least squares.

The final step in our modeling process is to obtain the computed values for the endogenous variables. As is easily seen, the equations alone would not allow one to forecast any of the endogenous variables. As econometricians know, this is true even after the coefficient values have been estimated using the three-stage least squares technique. The equations must be solved simultaneously using analytic methods. We have eight equations and eight unknowns. We solved the system for the endogenous variables in terms of the estimated parameters and the exogenous variables. Our forecasts are based on those estimated parameters for all periods. Forecasts made within the sample period are based on actual exogenous variables, and forecasts outside the period are based on the projected paths of exogenous variables.

Because the model includes lagged endogenous variables, these values were entered into the forecasts in a two-step process. The first step was to obtain the price index forecasts based on all exogenous variables. The second step was to use those price forecasts as if they were exogenous values in the one period ahead forecasts. This method is often used in dynamic simulations.

1.8 Compilation of Findings

1.8.0 Introduction

To aid the reader, we have included a compilation of our findings at this point. As the reader reviews our findings, two thoughts should be maintained. First, a major finding of this study is that the structure and estimated parameters of our model are consistent with orthodox economic analysis. Because of this, much can be inferred from the model about the qualitative nature of the economic activity resulting from the growing numbers of physicians. The second point is that because we developed a fully simultaneous integrated system of equations the impacts of more physicians in one sector is transmitted to other sectors as well. The result is a model that is not only estimated using simultaneous methods, but the forecasted values are obtained by solving the separate equations simultaneously to obtain the equilibrium values for the variables of interest.

The model was developed using orthodox economic analysis. Assumptions were made concerning the economic behavior of physicians and hospitals. The assumptions are essentially that individuals and organizations in the health care industry operate under the same incentives, pressures and constraints as all other economic entities.

An eight equation simultaneous equation model of the hospital and physician sectors was developed. It is based on the principles of supply and demand. The demand for physician services is disaggregated into three components -- private insurance, governmental, and out-of-pocket expenditures. The same decomposition was applied to hospital services. A single supply response for each sector was derived. These eight equations were estimated simultaneously using the three-stage least squares econometric technique. Forecasts for the endogenous variables were obtained from the parameter estimates and the exogenous variables. The estimated model allows us to test specific hypotheses concerning the operation of the health care sector. In addition, it allows us to make forecasts concerning the long run impact of the growing number of physicians on the cost of health care, the behavior of providers and the changing access to health care.

1.8.1 Findings Concerning Cost

The term physician "surplus" is a misnomer because we found no evidence that disequilibrium exists. The increase in supply of physicians will exert pressures on physician incomes and physician service prices. However, those pressures are only one of the elements contributing pressures on physician incomes and health care costs.

Three general concerns related to health care costs are expressed in the profession. These concerns revolve around price indices, total expenditures by government, and total expenditures by health categories. At times, the absolute levels are the focus, at other times the inflation adjusted relative or real level of expenditures receives the most attention.

The model forecasts the following impacts as a result of the growing numbers of physicians and the changing economic patterns in the health care industry.

- Cost of Physician and Hospital Services

Future price index increases in physician services will be moderated, but a cyclical pattern detected by the model will continue. The rate of hospital price (index) acceleration will be dramatically reduced from historical trends. However, they are forecasted to be substantially above the general price inflation through the next decade.

- **Total Expenditures on Hospital and Physician Services**

Growth in inflation adjusted total expenditures on physician services will be significantly below their historical trends. Total real expenditures on hospital services will maintain their historical trend. These trends are also seen when compared to forecasted disposable income. Total medical expenditures as a percent of disposable income are forecast to increase throughout the next decade as are its two components; hospital expenditures and physician expenditures. The expansion paths of these latter two series is relatively modest in the near term with cost growth increasing in the early 1990's.

- **Components of Total Expenditures on Health Care Services**

Total health care expenditures are defined as the sum of private insurance expenditures, government expenditures and direct or out-of-pocket payments. Out-of-pocket payments are composed of deductible and copayments for public and private insurance programs. In addition, this category includes payments for health expenses by those without health insurance.

- **Real Private Insurance Expenditures on Physician and Hospital Services**

Inflation adjusted expenditures on hospital services exhibit weak long wave cycles. These expenditures are forecast to increase at a constant rate to the mid 1980's and then increase and finally decrease at the beginning of the 1990's. Real private insurance expenditures for physician services will increase in the near term and then be subject to downward pressures. These pressures will only reduce the rate of increase rather than reduce the level of inflation adjusted expenditures on physician services.

- Real Government Expenditures on Hospital and Physician Services

The model predicts that inflation adjusted government expenditures will grow at their historical long term growth rate. Real physician expenses paid by all levels of government will grow at a rate lower than in the post medicare era and substantially lower than their most recent past.

- Third Party Reimbursements

Private insurance payments plus government payments represent total third party payments. Our model predicts that inflation adjusted third party payments for hospital services will parallel their historical trends but at a lower level. Competitive pressures on physician expenditures will be stronger and total third party expenditures are forecast to increase at rates much below their recent records and their post medicare historical trend.

- Out-of-Pocket Expenditures

Real out-of-pocket expenditures for all health care expenses show the most variability for technical reasons related to the way the data are obtained. Our model was specifically tailored to be compatible with the residual nature of direct expenditures. Care should be exercised in making detailed inferences from these data. Nevertheless, the model generally tracks these series well. Forecasts are for the inflation adjusted direct payments for hospital services to grow at rates faster than their historical trends. This may be a result of the changing mix of hospital services under the future competitive market structures. Out-of-pocket expenditures on physician services are also expected to increase at rates faster than seen in the most recent periods. However, the acceleration or explosive growth in this category is apparently ended as a result of the growing numbers of future physicians.

1.8.2 Findings Concerning Physician Behavior

In response to the increasing numbers of physicians, practicing physicians, hospitals and third party payers will compete. The net result of this competition is seen in our forecasts. How this behavior occurs is one element of market conduct. Our model is consistent with change in the health care industry, but not radical behavioral change. While competition is new to this industry, our findings are consistent with an industry facing new competitive opportunities and challenges. In this regard the health care industry could look to transportation, telecommunications, or finance to see how other basic service industries have reacted to increased competition.

- Pricing Behavior

Relative prices of physician services have not followed a smooth upward spiral. Rather they have a cyclical pattern. That cyclical pattern is apparently independent of macro economic cycles as measured by the National Bureau of Economic Research.

Physician prices are more volatile than are hospital prices. Part of the difference may be related to competitive conditions. Another part is likely to result from the reimbursement system. Changes to the competitive structure or reimbursement system would likely result in increased responsiveness of prices.

- Forms of Competition

We found that after direct price competition a whole array of competitive strategies and tactics of physicians can be expected to occur in the increasingly competitive health care industry. The report details the most likely forms they may take. One particularly noteworthy form is the competition between hospitals and physicians. The pressures to generate anti-competitive behavior were also discussed. A general impact of increased numbers of physicians is predicted to be experimentation and diversity of delivery of health services. Those innovations that meet the market test will spread. The limits on the actual forms of competition depend upon the creativity and ingenuity of physicians and their advisors.

1.8.3 Findings Concerning Access to Health Care

The report explains how the changing competitive structure of the industry leads to changes in behavior. These specific behaviors and general business conduct in the health care industry result in changes in performance. One element of the economic performance of the health care industry is access to care. We found a significant improvement in access will occur as a result of the increase in the numbers of physicians.

- General Definitions of Access to Health

A composite definition of access might be: "access to health care means people find no excessive hardships in obtaining adequate health care and those costs are distributed fairly." Hardships could include any financial service cost, waiting and travel time, and the cost and availability of transportation and other services including child care or employer paid time off work.

We found that a definition of this nature was unsatisfactory because it implied a community either had or did not have "access". Such a definition would be based on the subjective opinion of the evaluator and would be difficult to measure on a scientific basis. As economists, we believed the question was, "How is this industry performing?" The answer to that question is difficult to answer for any industry. We proposed the use of comparative analysis, that is, comparing access to health to access to other products and services in the economy. Until such research is conducted, we proposed looking at two broad areas--Financial Access and Functional Access.

- Financial Access and the Increase in Physicians

Our econometric model forecasts that more practicing doctors will mean more health care and the increase in the supply of services will retard the acceleration of both physician and hospital price indices. However, the growth in these two series is predicted to exceed the national inflation rate. More real resources will be devoted to the health care sector of the American economy.

However, we note that the impact of DRG's or other changes to the hospital reimbursement system were not modeled. After the budget neutrality period, these regulatory changes could have significant impacts.

Access is often discussed in terms of physician and hospital insurance. Our findings are consistent with the theory that insurance is a product of the tax system and not the health system. In effect, the government subsidizes the purchase of insurance by allowing employers to pay their employees in tax free insurance rather than taxable income. Our statistical results also indicate that medicare and medicaid reduce reliance on private insurance and that disposable income was a major determinant of financial access, as measured by insurance expenditures.

Financial access can also be measured by government's activities in health. While much concern is expressed about how well the private sector is meeting national needs, the public sector can be included as well. Access as measured by inflation adjusted government expenditures is forecast to increase through the 1980's. Hospital expenditures will increase along their historic trend. Physician expenditures are predicted to grow at a reduced rate principally due to the impact of competition on the physician sector. Slowing of the rates of growth still results in considerable expansion of the government programs in real terms and increases in access to care.

Total third party payments are the arithmetic sum of private insurance expenditures and government expenditures. In the sense that they indicate continuing access to health care through our current system, they are a measure of access. We found the impact of increased physicians was to increase access in both hospital and physician sectors.

More reliance on direct or out-of-pocket expenses is also predicted by the model. As competition increases, driven by increases in physician manpower, increasing amounts will be spent on direct expenditures. One reason is that consumers will find that they can obtain services that better meet their needs outside the third party reimbursement system. A second reason is that copayments and deductibles will be expected to prevail as expenditures grow.

- Functional Access to Health Care

One of the most critical access issues concerns the geographic distribution of health care professionals. Concern has been expressed for over 50 years about the geographical distribution of physicians. One of the implications of our time series model is that we would have more competition. As a result, new entrants to the profession would find it increasingly difficult to enter highly doctored areas. To analyze this issue we developed a county level cross-section time series model.

This econometric model indicated that competition has and will lead to a changing geographic distribution of primary care physicians. In effect, access will improve throughout our forecast period to 1990.

The model forecasts that the number of counties with population-to-primary care physician ratios greater than 3500-to-one will dramatically fall. This ratio was selected because it is the current criterion most counties must meet to be considered for designation as a Primary Care Health Manpower Shortage Area. The compound annual rate of decrease from 1982 to 1990 is about seven percent. This means that the number of these shortage counties will fall from about 900 to about 500.

We disaggregated the total by metropolitan and nonmetropolitan classification. Nonmetropolitan counties dominate the total, amounting to 85 percent of the total. The differences in these rates are detailed in the report. They indicate that competition is active in both groups of counties.

We also applied our methodology to counties with relatively more physicians and yet considered to be underserved. The overall pattern is consistent with a differential growth process. We found that the particular demographic and economic conditions of the county in conjunction with the physician situation determines the county's future status. These results are consistent with our other results concerning increased level of competition in the health care sector.

2.0 THE IMPACT OF THE PROJECTED PHYSICIAN SURPLUS ON THE COST OF HEALTH CARE

2.0 Introduction

As we discussed in the general overview of the project, one of the major tasks was to develop the technology to investigate questions like the one posed in this section. Will the physician "shortage" increase costs, decrease costs or leave future costs unchanged? That question is very similar to the following question, "Will health care costs increase, decrease or remain the same in the future?" but it is not exactly the same. The difference is that we can begin to disentangle the numerous and interacting forces that impact on the health care markets. This is important because, as we will explain, health care costs may well increase in the next decade, even though the growing numbers of physicians exert a restraining pressure on their costs. However, before the impacts of the physician "shortage" can be discussed we need to know some of the economic concepts used in the analysis.

2.1 Competition

Economists have particularly stringent criteria for pure or perfect competition. This is almost akin to the physicist's ideal gas or frictionless plane. The assumption is used to progress from the text book or laboratory to more interesting real world situations. In perfect competition there would be no competition as it is discussed in the health care industry. All prices would be the same because all services would be the same. There would be no government restrictions, regulations or other imperfections in the market. Each physician and hospital would be a small part of the community's health care delivery system and could not have a perceptible impact on it. There would be no organized medicine and there would be free entry into the profession. Everyone would know about the quality of treatment and it would be uniform in the simplest case and differentiated by hedonic services characteristics in slightly more complex versions. In this situation people could become physicians on short notice, could construct hospitals quickly and the market forces we see in other professions such as education, law or airline pilots would be operational.

At the other extreme, our laboratory case would be monopoly. Here again we would have none of the entrepreneurial or business competition that fills the pages of trade publications in the health care business. As a single seller of the service, the monopoly physician or hospital would have no competition from rivals. In more sophisticated elementary approaches the threat of entry is introduced. However, we still have all of the other stringent assumptions about the service and the behaviors of the economic participants. Between pure or perfect competition and monopoly, there are numerous oligopoly models and monopolistic competition. These all attempt to expand the scope of the economic activity under analysis. These formal models all serve the purpose stipulating laboratory conditions in dealing with applied situations. In these cases, experienced modelers usually attempt to capture the most important attributes of the economy. In our work we began with the competitive model and expanded from that point. For an extended discussion of market imperfection and market failure see Section C in the technical appendix.

We found that competition existed in a number of diverse dimensions. The essence of entrepreneurial competition would be two or more individuals or organizations striving to achieve the same objective.[1] Tactics and strategies employed by competitors are as varied and diverse as individual creativity. In health or any industry the exact nature of new competition is difficult, if not impossible to predict. However, one reoccurring result seems to prevail. The result is that prices of goods or services tend to equal the cost of production. More specifically, the market prices tend to equal marginal costs. In this case, marginal costs are the full costs of producing service.

---

[1] Friedrich A. Hayek, Individualism and Economic Order, Chapter 5, Meaning of Competition, University of Chicago Press, 1948.

Far from an academic exercise, this approach leads to significant insights into the operation of the health care sector. We found that prices were following a pattern of reaction to changes in market conditions. As we outlined above, the specific details of how this has occurred is complex. It is discussed in detail in the section of physician behavior. In the sections that follow, the preceding explanation of competition will be used throughout. One of its first implications is that the term physician "surplus" is a misnomer.

2.2 The Misnomer of Physician "Surplus"

A physician surplus would exist if the supply of physicians exceeded the demand for physicians at current physician income levels. The surplus would exist if physician incomes did not fall sufficiently to establish equilibrium between quantity supplied and quantity demanded. There exists some evidence that real (inflation adjusted) incomes of physicians have been falling through the decade of the 1970's.[2] Our research did not focus on the economic status or financial conditions of physicians per se. Rather, our study focused on the physician and hospital services. The distinction is somewhat subtle. The demand for physicians is derived from the demand for physician services. This is the critical link between the product market for health care services and the factor market for labor services of physicians. To understand the manpower needs of the industry, it is necessary that we understand the operation of the health care industry. Our approach specifically included the impact of the physician labor market on the supply of services and the quantity demanded of health care services.

The term "surplus" is a misnomer because we found no evidence that there was a disequilibrium at market prices between quantity supplied and demanded. Falling incomes or prices do not alone imply that there is a long run disequilibrium only that there is a relative shift in demand and supply, or an increase in competition. Increases in competition would reduce the divergence between price and marginal cost, thus reducing market price holding all other factors constant. Our statistical methods allowed us to hold those costs and other factors constant.

---

[2] The interested reader is referred to the various AMA's Periodic Survey of Physicians, the Profile of Medical Practice or Supply and Characteristics of Selected Health Personnel, HRA 81-20. Also note that subsequent income data are based on a new definition of income. These new data are not comparable to the data we cite. The AMA new telephone survey has the same compatibility problems.

It should also be noted that, as economists, we could not analyze the adequacy of the number of physicians in terms of medical criteria. The notion that physicians or others could determine society's needs is not consistent with most economic approaches to industrial organization. Having a "surplus" or "shortage" defined by individuals who are connected with the industry is suspect. It is suspect not simply because those who set the standard have a self-interest, because every individual has a self-interest. It is suspect not because health professionals do not have experience with law, education or other professions (because over the long run, more or less physicians necessarily means less or more lawyers, teachers, biologists or other professionals). In our society, many interrelated decisions are made without understanding the ramifications of those decisions. It is suspect because economists generally believe that no one knows how many physicians we should have. It is the market, the interaction between patients and the providers, that will tell us how many physicians or physician services are enough.

In this research project we have not made the subjective judgement nor the medical judgement that we have a surplus. We have simply introduced the actual and forecast increase in the numbers of physicians into our model using conventional economic analysis. Our results tend to confirm that this methodology results in findings that are consistent with orthodox economic analysis.

2.3 Alternative Cost Concepts

At least three general cost concepts exist in the health field. Unfortunately, they do not have the same economic interpretation, and no consensus exists concerning which concept is applicable in policy discussions. While we believe it would be possible to disentangle this situation, that project is beyond the scope of this study. We will present those alternative costs and later discuss our findings relative to the alternative measures.

One concept of cost is the price individuals, or third parties pay for health care services. This is usually the physician service or hospital service component of the consumer price index. Less frequently used is the Medicare price index. In effect, the question being answered is how much does a constant physical quantity of services cost today as compared to a base period. It should be noted that simply measuring the cost of services over time is far from perfect since visit or service intensity may increase over time with increases in technology or medical knowledge. This measure is also different from the unit cost of a DRG. Over time, we may be able to obtain costs of outcomes. However, at this time we must use services, which are of course inputs to health care, rather than outcomes or the results of the health care process. The latter would be preferred for some health economic analysis. For others the relevant cost measure is the relative price of medical services.[3]

The second major cost concept in policy debate is related to government expenditures. A major concern seems to be the government's cost of medical care. Much of the debate concerns Federal expenditures -- primarily Medicare. However, the costs borne by the State's share of Medicaid is growing in importance as well.

Debate usually focuses on the absolute magnitude of these expenditures, however, sometimes these are deflated by a price or cost index such as the Medicare cost index. Recent debate has been expanded to include the Medicare

---

[3] The rationale for this can be seen by considering a market demand function specified in money terms and then dividing it through by the general price index to obtain real or deflated values for quantities and income.

$$Q_d = \alpha + \beta P_m + \gamma YD + \varepsilon$$

$$Q_d P_y^{-1} = a + bP_m P_y^{-1} + c\,YD \cdot P_y^{-1} + \mu$$

trust fund balance as a health financing issue. Previous discussions only regarded it as a source of interim interfund borrowing connected with Social Security funding. Our study did not address this final aspect of governmental cost. However, solutions to the trust fund imperative should not be oblivious to the forecasts and findings of this study.

The final cost classification are total costs of health care. Sometimes these costs are expressed in current dollar amounts. In other cases they are deflated by an overall price index, such as the CPI or the GNP price deflator. Of course, the health care component of the CPI is also used to deflate these aggregate data. Another cost basis is health care expenditures compared to GNP or another measure of aggregate economic activity.

The objective of most of these cost concepts seems to be to measure the level of resources devoted to the health care sector. In some cases one measure could be preferable to another. However, it is clear that there is no one measure of cost of health care. By explicitly discussing these alternative and often divergent cost concepts, we hope to shed light on the issues concerning the impact of the growing numbers of physicians on the cost of health care. Without belaboring the issue, it is clear from this analysis that cost based on one concept could decrease, on a second concept could increase, and on a third concept could remain constant or cycle. This is, in fact, what we found.

2.4 Research Findings

2.4.1 Overview

Over the next decade, cost of physician services will follow a cyclical pattern and hospital prices will stabilize. Total real expenditures on hospital services will continue their upward trend with a slight decrease in growth from their historical trend. The growth in total real expenditures on physician services will be substantially below their long-term trend. However, the growth in real expenditures is only moderated, not eliminated. This is also seen when total expenditures are compared to personal disposable income. Expenditures on hospital services and physician services as a percent of disposable income continue to grow.

Real expenditures on physician services paid by insurance will fall below their long-term trend, tend to increase through 1984, then to decrease until 1987 and begin increasing in the latter part of the decade. Real private insurance expenditures on hospital services are also below their long-run trend values. Their forecast trend is relatively flat through 1985, then rises through 1988 and then decreases.

Inflation adjusted government expenditures on hospital services are forecast to follow an almost linear trend throughout our forecast period to 1990. This contrasts with the growth in real governmental expenditures on physician services. The long-term trend in these expenditures is moderated in the forecast period. Not only is the absolute level of governmental expenditures below their historical growth path, but the rate of growth is moderated through most of the forecast period.

When private insured expenditures are combined with governmental expenditures an interesting result is revealed. Third party hospital expenditures will parallel their historical trend, but will be below it. The growth rate will further moderate near the end of the decade. The model forecasts third party payments for physician services to diverge from the historical trend, and then parallel the former growth trend.

Direct payments, as we explained, are a residual in the government data. That is, third party payments (both private insurance and all government payments) are subtracted from total expenditures to compute direct payments. They include both co-payments and deductibles by the insured, plus payments by the uninsured, and any statistical or measurement error. For this reason, it contains more statistical noise and is more difficult to model, a fact that is well known amongst researchers in the field.

Direct hospital expenditures, corrected for inflation, are forecast to be above their most recent historical values and long-term trend. However, they appear to cycle reaching a peak in 1983, a trough in 1987 and then increase again. Direct inflation adjusted expenditures for physician services are forecast to grow at a slower rate than in the immediate past. In both cases, the forecasts of the real level of expenditures appears to be increasing on average over our forecast horizon.

To summarize this brief overview, the impact of the increasing supply of physicians on health care costs is complex. The classical forces of market dynamics appear to be at work concerning prices. Future cost increases of physician services appear to be moderated. Hospital cost escalation is substantially reduced from its historical trend. The growth in real expenditures for hospital services is moderated. Physician services are clearly predicted to react as would be expected in a competitive market. This reaction pattern was established in the sample period and it is forecasted to continue in the forecast period to 1990. In the next section these cost elements are discussed in more detail.

2.4.2 Cost of Physician Services

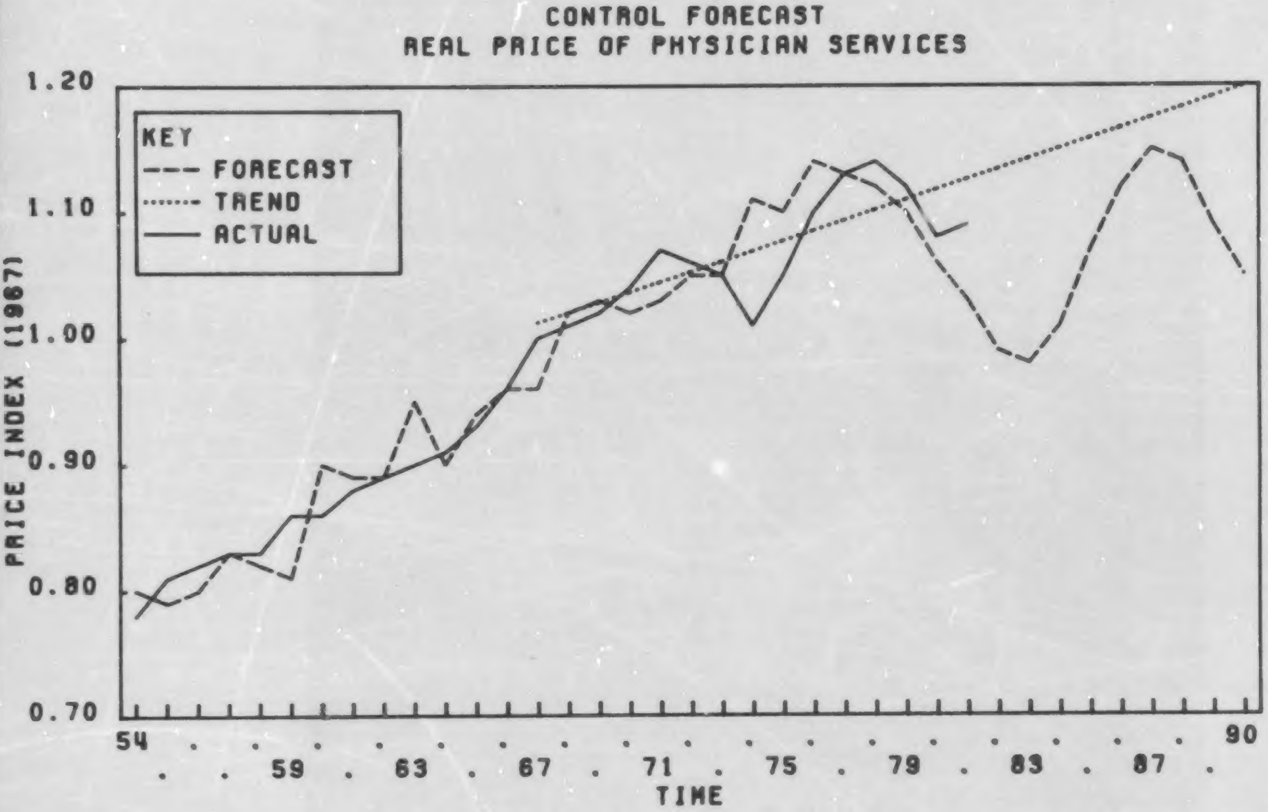
The impact of the projected increases in the number of physicians is predicted to reduce the general average level of the physician price index. However, these costs are not forecasted to be uniformly lower in the future. On the contrary, the prices cycle in the forecast. This cycle seems to be following a pattern begun in the late 1960's. Prices began a rapid increase from 1967 peaking in 1971 and fell to a trough in 1974. The cycle began again, peaked in 1978 and seemed to have troughed in 1980. Our forecasts generally follow this pattern, but lead the actual values in recent years.

It should also be emphasized that the model has not been calibrated for exact forecasts for distribution to the general public. If this were our objective, we would recalibrate our most recent forecasts and introduce additional statistical techniques to improve the most current period tracking performance. These methods are used by all econometric forecasting models developed in private industry and federal agencies. For our analytic purposes, end period tracking adjustments would not have altered results concerning the impact of the growing numbers of physicians.

The model predicts future price cycles in the costs of physician services. While great care should be exercised in stating the precise turning points of the turns in these data, the cyclical pattern is of great policy significance. If proposed policy actions have a lag in implementation and a lag in effect, policies may actually reinforce a cycle rather than stabilize it. Also, it should be clear that the history of physician costs have not been a steady and smooth pattern of increases (see Figure 2.1).

The pattern seems to be the result of very sophisticated and complex interactions in a simultaneously determined system. After performing additional simulations and tests, one inference seems to dominate. That inference is that relative physician costs of health care have acted as a stabilizing influence helping to bring the health care sector into equilibrium. In the formulation of this model, increases in demand by any one sector or all sectors result in positive pressures on prices. Prices respond to that pressure and costs of health care increase. Also, supply apparently reacts as well. This supply response seems to have the impact of not only overpowering the inflating effects of demand increases but actually causing the relative price to decrease. This correcting or equilibrating function of prices has resulted in a relatively smooth increase in the real quantity of physician services over time. The forecasted swings in prices may indicate a market in the process of massive readjustments to new and more intense competitive conditions within the physician sector of the health care industry.

Figure 2.1


CONTROL FORECAST
REAL PRICE OF PHYSICIAN SERVICES
KEY
FORECAST
TREND
ACTUAL
PRICE INDEX (1967)
1.20
1.10
1.00
0.90
0.80
0.70
54
59
63
67
71
75
79
83
87
90
TIME

2.4.3 Cost of Hospital Services

The impact of the projected increases in numbers of physicians is predicted to hold relative hospital cost virtually constant (see Figure 2.2). It is critical to note that this does not mean zero cost or price inflation. Our relative price index is constant at about 1.65. This means that hospital costs are projected to grow at a rate 165 percent faster than the all-item consumer price index. However, the general trend of cost acceleration, where over long periods hospital cost inflation out paced general inflation by larger and larger amounts, seems to be contained.

Hospital costs seem to have had a cyclical pattern very closely related to that found within the physician sector. A period of rapid acceleration begins about 1967, peaks and falls to a trough in 1974. Prices rise again to a peak and then slightly decline to 1980 when they start up again.[4] While price controls may have been partially responsible for the mid 1970's flattening, the second reoccurrence has no equivalent parallel explanation. These cyclical patterns are remarkably like the ones in physician prices in their frequency and minimum points. The peaks do not have a similar pattern to those in the hospital sector which are considerably dampened.

---

[4] As explained in the technical appendix, we have accounted for the Economic Stabilization Program instituted from August 1971 to April 1974 in our model specification.

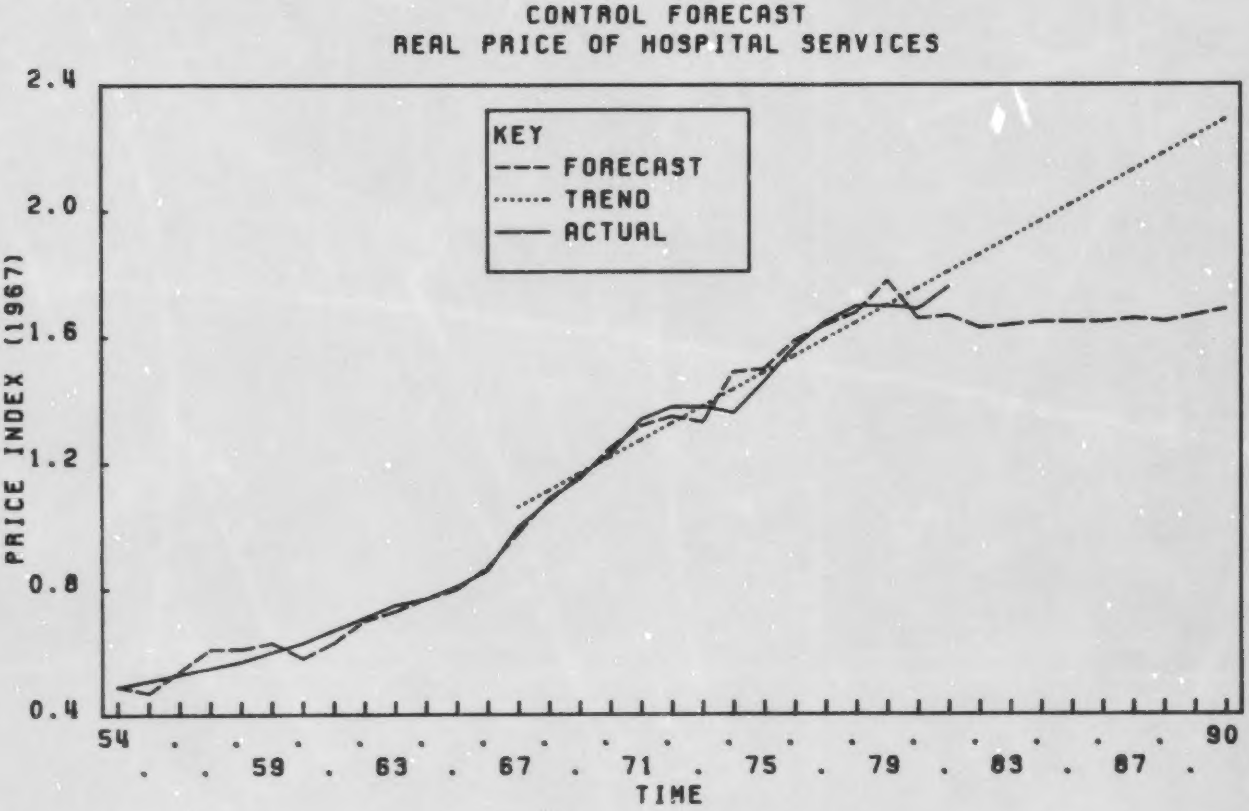
One possible additional point concerns the competition between hospitals and physicians. We know that competition leads to greater efficiency in the economic sense under a wide variety of conditions.[5] We also know that physician services and hospital services are gross substitutes in our insurance demand model and gross compliments in our out-of-pocket demand model. This is, of course, what one might expect in a rational health expenditure model. When individuals can plan and choose, they assess their expected demands and substitute one service for another (using the term substitute in its popular vernacular). If direct expenditures are dominated by co-pay and deductibles, we would expect hospital service and physician service expenditures to be compliments. Large hospital and large physician expenditures would certainly behave in this way. However, the payment component of direct expenditures by the uninsured could either exhibit complementarity or substitutability between the services.

---

[5] Greater efficiency in this context means price is closer to marginal cost. Using our definition of competition, this result is consistent with a change in the Learner index, moving from a less to a more competitive market structure.

From our insurance equation we might expect substitutability to result. In any event, there is clearly competition between these two sectors. The model determined that price adjustments in the physician sector are an equilibrating force. In the hospital sector, prices serve that purpose but to a lesser extent. This may be due to the reimbursement system and to the fact that our price index is an imperfect measure of the market price of services delivered by the quality adjusted case mix constant hospital.

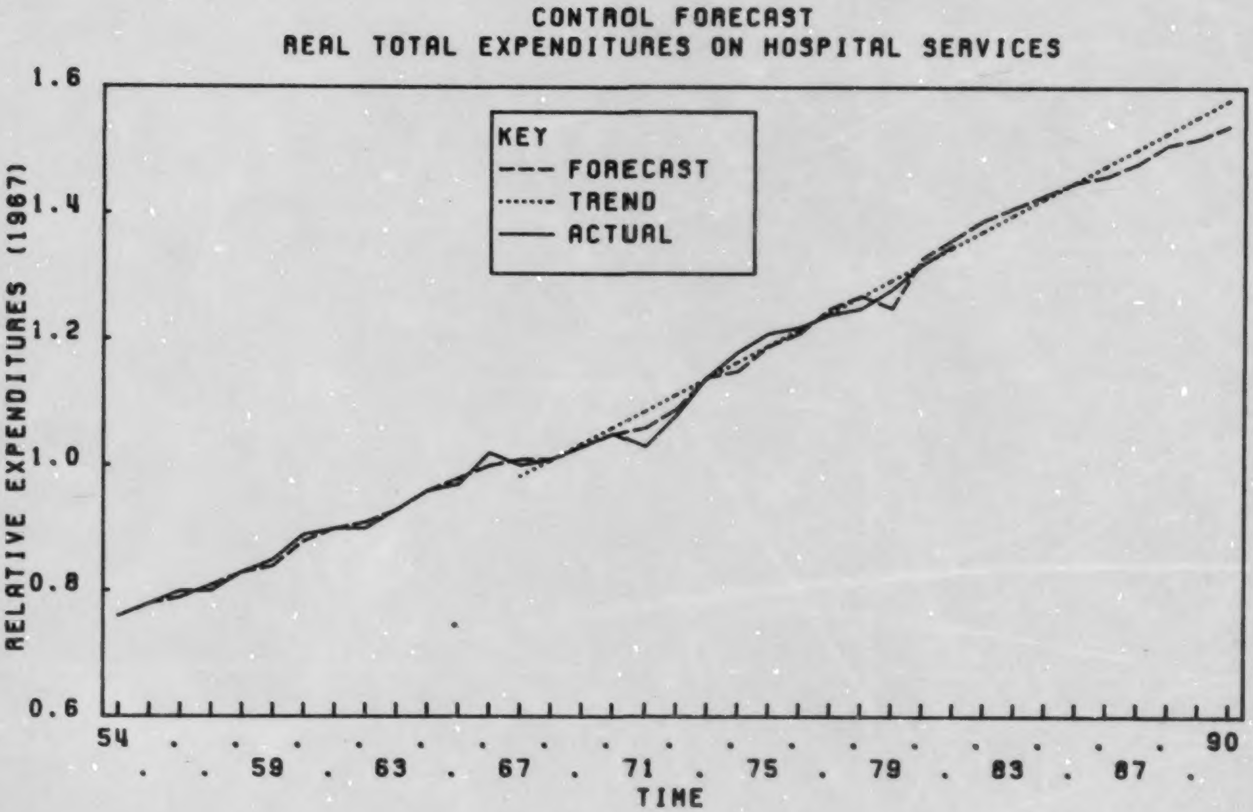
Figure 2.2


CONTROL FORECAST
REAL PRICE OF HOSPITAL SERVICES
KEY
FORECAST
TREND
ACTUAL
PRICE INDEX (1967)
2.4
2.0
1.6
1.2
0.8
0.4
54
59
63
67
71
75
79
83
87
90
TIME

2.4.4 Total Hospital Services Expenditures

The impact of the projected increase in the numbers of physicians is forecast to have little impact on the growth in inflation adjusted total expenditures incurred on hospital services. Our forecast is for a slightly moderating trend (see Figure 2.3). It should be noted that the new DRG reimbursement system was first implemented on October 1, 1983 and the draft of this report is being submitted on October 31, 1983. Future research will necessarily be focused on this new and possibly significant structural change to the hospital sector. An historical data series, based on DRG's, will also be required if econometric estimation is to be performed.

Figure 2.3


CONTROL FORECAST
REAL TOTAL EXPENDITURES ON HOSPITAL SERVICES
KEY
FORECAST
TREND
ACTUAL
RELATIVE EXPENDITURES (1967)
1.6
1.4
1.2
1.0
0.8
0.6
54
59
63
67
71
75
79
83
87
90
TIME

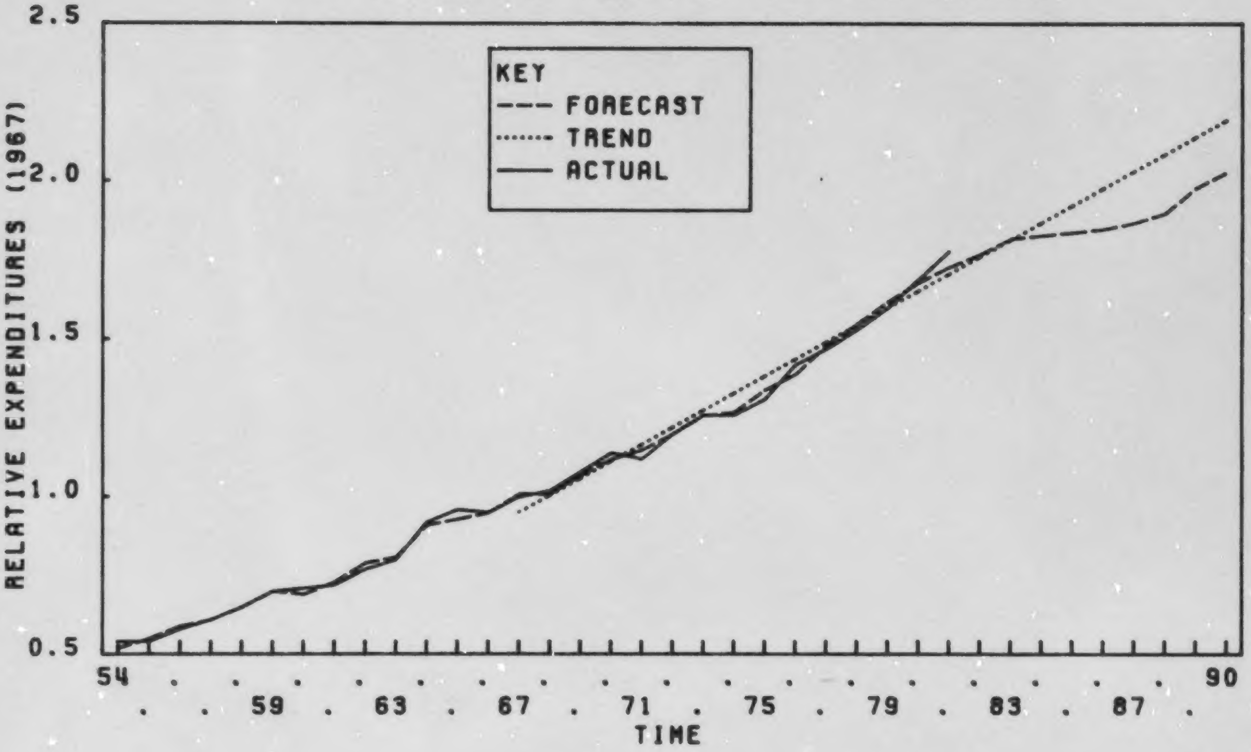
2.4.5 Total Physician Services Expenditures

The impact of the projected increase in the number of physicians is forecast to have a significant impact on total inflation adjusted expenditures incurred on physician services. Growth in real expenditures has accelerated from the mid 1970's. Our model predicts that this acceleration will be reduced, but we will have considerable future growth (see Figure 2.4). This certainly means that health care in general, and physician services in particular, will require more economic resources in a real sense. However, the rate of increase will be retarded by growing numbers of physicians.

It should also be noted that the model is indicating that these pressures have been in operation for the last few years. Actual values seem to be accelerating while the model predicts increases, but at a slower rate. Our estimations are based on the latest available data. Nevertheless, when new data become available, these new data should be used to reestimate the model parameters. In our research, we performed some simulations for internal consistency evaluation. The model performed well. We would expect no changes in the substantive findings of our project. However, reestimation with the latest available data will produce the most desirable current forecasts.

Figure 2.4

CONTROL FORECAST
REAL TOTAL EXPENDITURES ON PHYSICIAN SERVICES



2.4.6 Total Health Expenditures as a Percent of Disposable Income

Total health expenditures as a percent of disposable personal income generally fell through from the beginning of our sample period to 1973, took an inverted J-shaped leap to 1978, and escalated rapidly to 1981 (see Figure 2.5.1).

Specialists familiar with these will recognize this pattern, but may be unfamiliar with the basis of the analysis as it is discussed here. First recall that in our analysis we only consider physicians and hospital services. They compose 67.8 percent of the total health care system cost. The 1981 distribution of all costs is as follows.

Type of Services	Percentage Distribution	
Hospital Services	46.3	) 67.8
Physician's Services	21.5	
Dentist's Services	6.8	
Other Professional Services	2.5	
Drugs and Medical Sundries	8.4	
Eye Glasses and Appliances	2.2	
Nursing Home Care	9.5	
Other Health Services	2.8	
	100.0	

Looking at our Figure 2.5.1, one may recall much of the popular press discussions of health care costs reaching 10 percent (9.8 percent in 1981) of Gross National Product. Our estimates include approximately two-thirds of the total and that would imply a total share of about 15 percent.

But note that we use Disposable Personal Income rather than GNP. Disposable Personal Income is composed of wages and salaries including supplements, net interest payments, rental income of individuals and business profits (including both net income of unincorporated businesses and corporations), less personal income taxes. Disposable Personal Income can be obtained from GNP by subtracting indirect business taxes and minor adjustment items and also subtracting capital consumption allowances or depreciation. In 1981, Disposable Personal Income was about 70 percent of GNP, thus our estimates imply a total health care share of GNP to be approximately 10 percent and our data are consistent with the more broadly defined concepts of health care and aggregate economic activity.

Our measures focus on the most currently relevant policy sensitive areas. The model forecasts a slowing in the growing share of national resources going into health care. Part of this slowing is that the economy is expected to grow at a more rapid rate than the health sector and the health sector's growth is forecasted to be slower than its historic trend. The components of this last trend are more interesting.

The total health care expenditure is composed of two parts, each moving in opposite directions. Hospital expenditures as a fraction of Disposable Income has been generally falling throughout our sample period. The only exception being the 1973-1975 period and the most recent post 1978 period. The model predicts that our most recent trend of increasing health care share will continue throughout our forecast period to 1990 (see Figure 2.5.2).

Physician expenditures as a share of personal disposable income have the opposite pattern within the sample period. They follow a generally increasing pattern with the growth accelerating in two periods in the mid 1970's to the end of our sample. The model forecasts a flattening of this trend with a resurgence of growth in the latter part of the decade of the 1980's into the early 1990's (see Figure 2.5.3). Again these components are a composit of the expansion, or lack of it, in the health sector and the expected path of aggregate economic activity. Our concern is the amount of real productive resources employed by the health sector. As a growing proportion of our economy is devoted to health, the real cost of health must inevitably increase. All economic inputs or factors are not completely unspecialized or perfectly interchangeable between industries. As resources shift from other activities to health, decreasing real productivity will necessarily prevail. Sophisticated mathematical models have been developed to show these relations in general circumstances. This is also consistent with conventional nonquantitative analysis. These are reasons why our forecasts of health care share of aggregate economic activity are important to understanding the impact of the changing conditions in the health care sector as brought about by the projected increase in physicians.

Figure 2.5.1

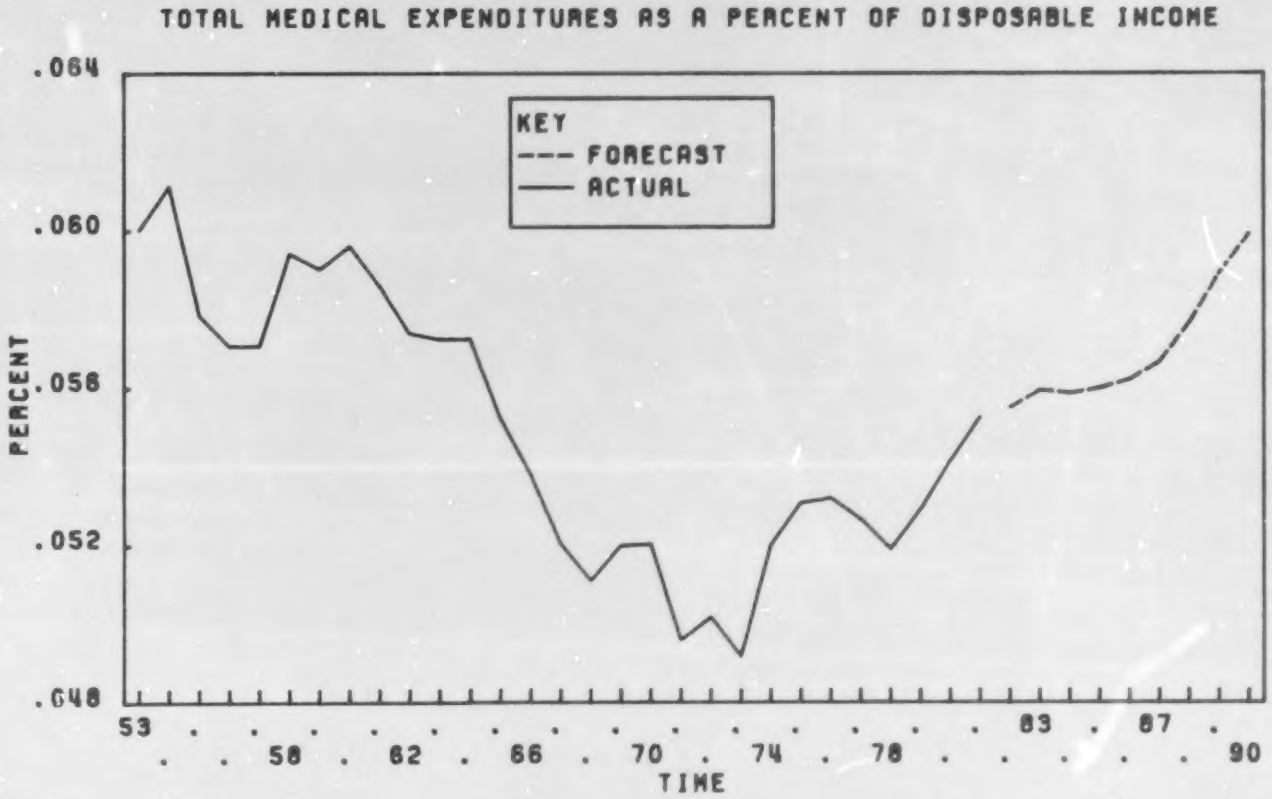

TOTAL MEDICAL EXPENDITURES AS A PERCENT OF DISPOSABLE INCOME
KEY
--- FORECAST
—— ACTUAL
PERCENT
.064
.060
.056
.052
.048
TIME
53
58
62
66
70
74
78
83
87
90

Figure 2.5.2

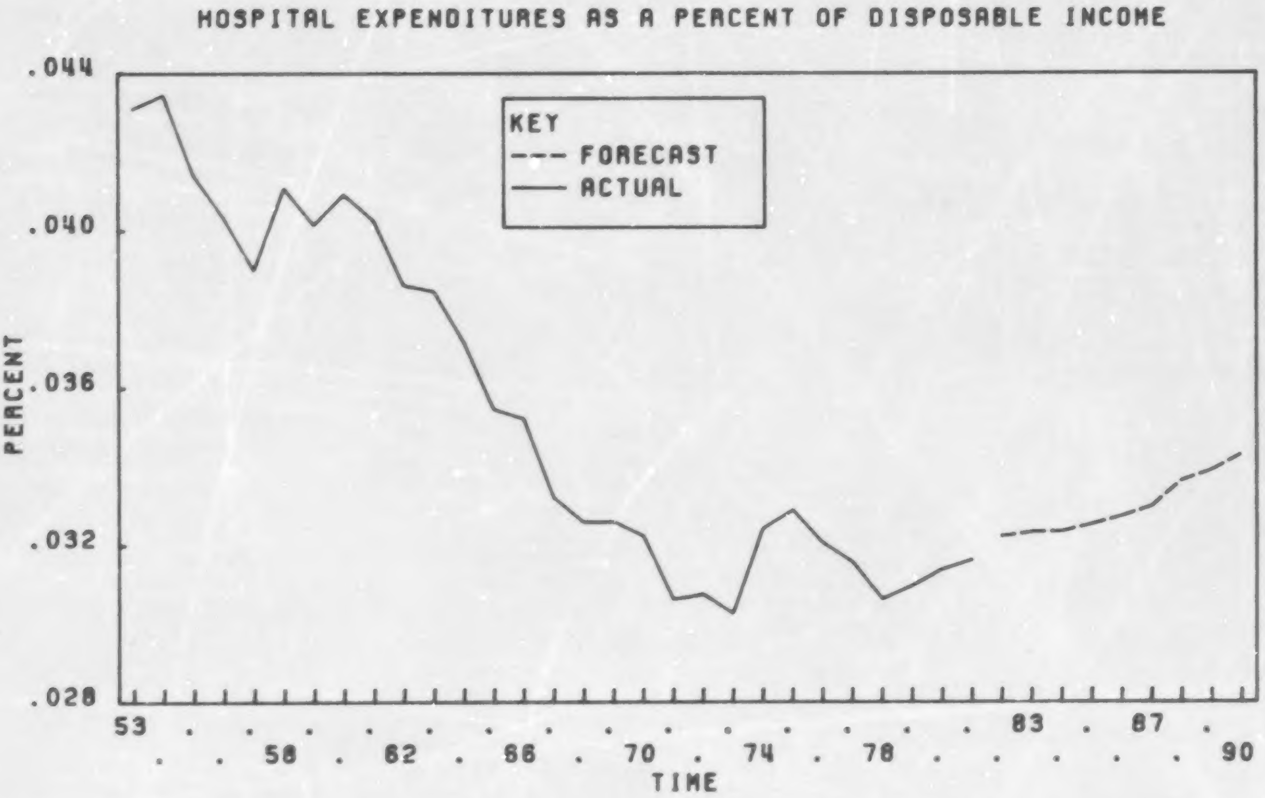
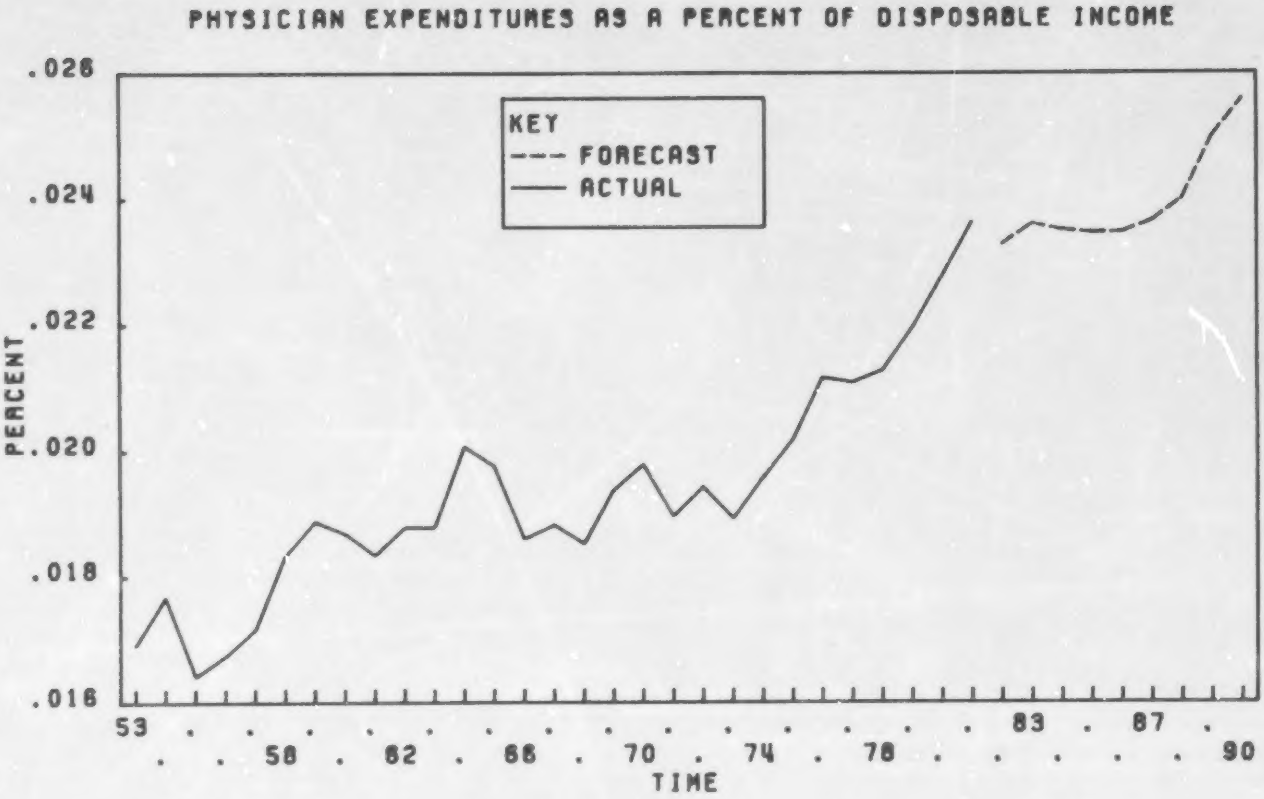

HOSPITAL EXPENDITURES AS A PERCENT OF DISPOSABLE INCOME
KEY
--- FORECAST
— ACTUAL
PERCENT
.044
.040
.036
.032
.028
53
58
62
66
70
74
78
83
87
90
TIME

Figure 2.5.3


PHYSICIAN EXPENDITURES AS A PERCENT OF DISPOSABLE INCOME
KEY
FORECAST
ACTUAL
PERCENT
.026
.024
.022
.020
.018
.016
53
58
62
66
70
74
78
83
87
90
TIME

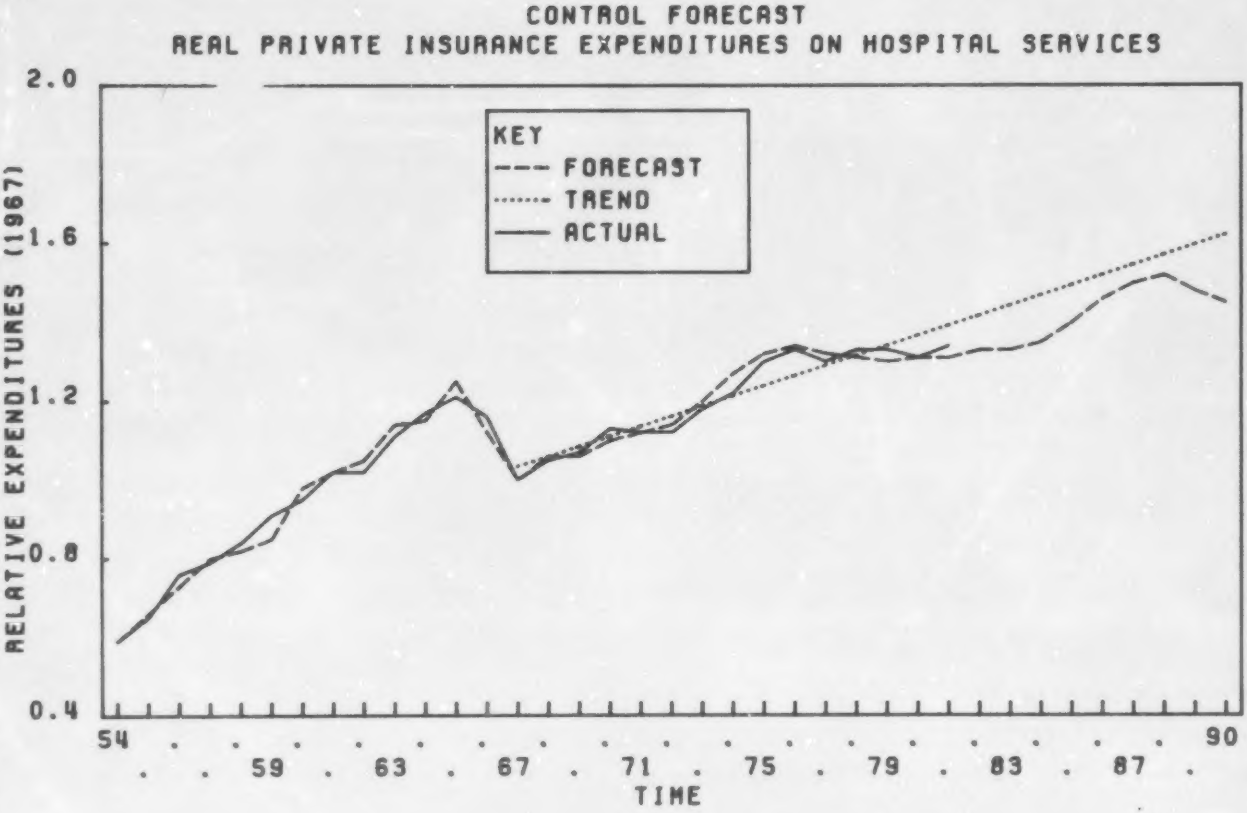
2.4.7 Real Private Insurance Expenditures on Hospital Services

The model forecasts a long wave cycle in this expenditure classification. A peak in inflation adjusted private insurance expenditures incurred on hospital services occurred in 1965, 1976, and is predicted to reoccur in 1988. These 11 or 12 year cycles may be an artifact of the data, but they deserve additional investigation in the future. These cycles, if cycles do exist, are not coincident with the macro economic business cycles, nor are they associated with the peaks or troughs noted in the price data. Furthermore, while cycles seem to be present in these data and in the price series, no other distinct cycles were identified. While some interesting and important cyclic behavior was identified in past data and forecasted to reoccur in the future, these cycles do not occur in all health care sectors (see Figure 2.6).

The interested reader is referred to the technical appendix for a detailed discussion of the technical issues connected with real private insurance expenditures on hospital services. In addition to the growing number of physicians, many other factors are influential in explaining the future of privately insured hospital expenditures. One important influence on insurance for both hospital and physician services is tax. Insurance expenses are tax deductible for employers. Neither health insurance premiums nor benefits are considered to be income for tax purposes. This establishes powerful economic forces at work to promote increasing levels of expenditures. However, with the large proportion of individuals currently covered by hospital insurance this influence would tend to stimulate first dollar coverage and reductions in co-pay and deductibles. These are, of course, the targets for many cost containment proposals.

Another aspect of the relatively flat growth projections for inflation adjusted expenditures is the competition between hospital services and physician services. In most industries products or services have both substitutability and complementarity characteristics. Our model found the substitution aspects to dominate the others. Moderating physician prices would tend to moderate the growth in insured hospital expenses. In effect, individuals, employers and insurance companies would be motivating forces in reducing the growth in hospital expenditures. This is one characteristic of the competitive market at work that determines the impact of the growing numbers of physicians on the cost of health care. Much more technical details of these forces are outlined in the appendix.

Figure 2.6


CONTROL FORECAST
REAL PRIVATE INSURANCE EXPENDITURES ON HOSPITAL SERVICES
KEY
FORECAST
TREND
ACTUAL
RELATIVE EXPENDITURES (1967)
2.0
1.6
1.2
0.8
0.4
54
59
63
67
71
75
79
83
87
90
TIME

2.4.8 Real Private Insurance Expenditures on Physician Services

The model projects an increase in expenditures, a period of falling real expenditures and than an increase (see Figure 2.7). Decreases in the level of inflation constant physician service expenditures have occurred several times within our sample period. These down turns in real expenditures were brief, lasting only one year. Our model forecasts a four year down trend and that is principally due to the mounting competitive pressures within the physician sector of the health care system.

The forecast growth for real physician insurance expenditures predicts continued increase in real expenditures through 1983, but at a level well below the post 1967 historical trend. When that trend peaks and falls for four years and then begins an up trend, it will be substantially below the historical pattern. The principal cause of this reduction is from the moderating of all physician expenditures. Nevertheless, some tendency for significant increases in indirect or out-of-pocket expenses is also forecast. It may be that as competition intensifies, some individuals will find it to their economic advantage to forego some of the tax advantages of insured expenditures for the benefits of shopping for physician care. The model is based on the historical forces already operating in the economy. Also, it should be noted that we have not anticipated or introduced any new or nonexisting programs or regulations into the model.

We cannot predict the exact form in which actual competition will be manifest. It may be that individuals will press for the option of receiving wage income directly (paying income tax) and then seeking the care they desire. For families establishing fitness, wellness and prevention programs, this may be considerably more cost effective than the insurance programs available in 1990. However, we have not attempted to speculate on major structural changes occurring in response to or independent of these predicted changes. For example, competition may lead to significant ways to reduce costs for some services, but not those associated with major or long-term illness. Pressures may develop for private or public catastrophic health insurance. Such a program could have important impacts on the future cost of health care.

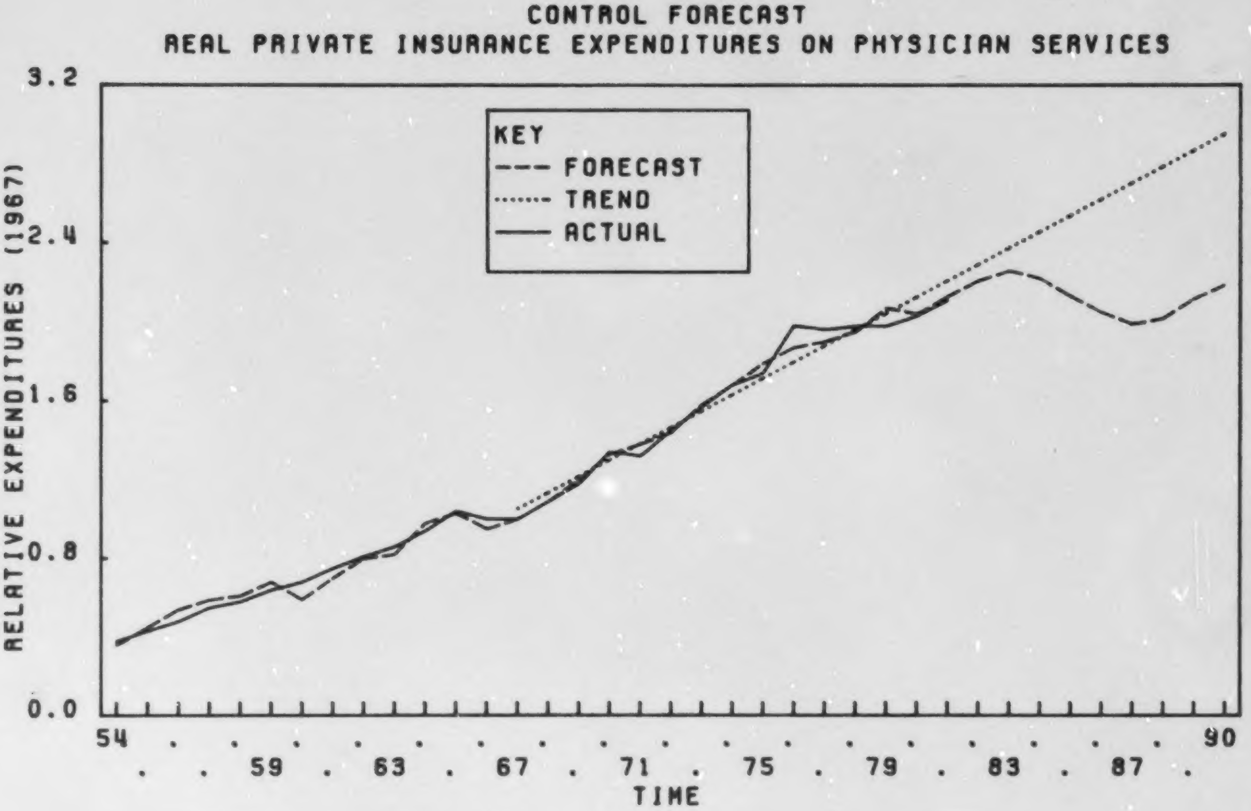
A more detailed discussion of the factors leading to this result are contained in the technical appendix. A few points should be highlighted at this time. Insured health expenditures on physician services are viewed, in part, as compensation for labor services. Because of this, macro economic activity has an impact on these expenditures.

Higher levels of economic activity are correlated with higher levels of physician expenditures. Over the long run, more individuals are covered. In the aggregate, their coverage could be more intensive, especially after greater numbers are participants as in hospital insurance programs.

Hospital services were found to be gross substitutes (in consumption) for physician services. While the acceleration in hospital prices is projected to stop, the speed of hospital cost increases is still far in excess of the general economy and those of physician services as well. One interpretation of the model is that continued substantial cost increases above the general inflation rate adds fuel to the competitive fire and increases the competitive substitution of physician services for hospital services. That is, in the absence of regulatory changes in the hospital sector, we would expect to see lower physician expenditures if the hospital sector becomes more competitive. If regulations are changed to further promote competition, this process could be stimulated. By the same logic, regulatory changes that only shifted costs, or maintained cost based reimbursement, may only have regional impacts without any national aggregate effect.

Finally, it should be noted that the long run impact of Medicare and Medicaid continues to be the reduction of insured (and out-of-pocket) level of expenditures for physician and hospital services. It is, of course, no surprise to health economists or other health professionals that the program continues to substitute, in part, public expenditures for those that would be funded from individual private sources. This close tie between the government sector and the private sector was carefully considered when the analysis was developed. The researchers did not know the exact nature or even the direction of that interaction, but provision for it was incorporated into the analysis. Because of this close and complex tie between government programs and private sector results, care should be taken when considering the cost impact of various regulatory plans. Competitive forces are apparently just now beginning to come into play in this market. The relative long periods of time needed to see important changes should be considered when accessing the impact of new proposals in reaction to or in concert with the impact of the projected increase in numbers of physicians.

Figure 2.7

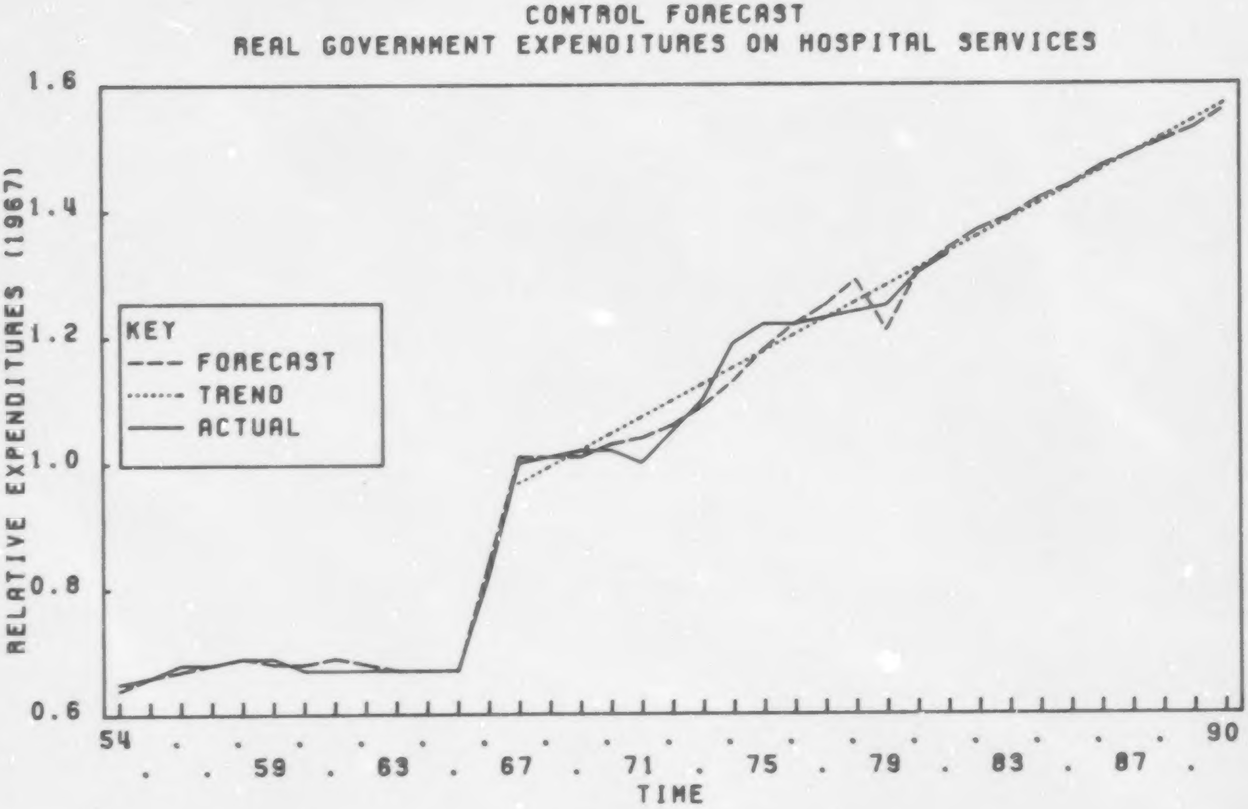

CONTROL FORECAST
REAL PRIVATE INSURANCE EXPENDITURES ON PHYSICIAN SERVICES
KEY
FORECAST
TREND
ACTUAL
RELATIVE EXPENDITURES (1967)
3.2
2.4
1.6
0.8
0.0
54
59
63
67
71
75
79
83
87
90
TIME

2.4.9 Real Government Expenditures on Hospital Services

Hospital services purchased by all governmental programs are forecast to increase at their historic trend. Establishing the Medicare and Medicaid programs had a major impact in the health care sector. It reduced nongovernmental expenditures and increased governmental spending for health care generally, and hospital services in particular. As the over 65 age cohort becomes a larger proportion of the population, the impact of the Medicare programs will grow (see Figure 2.8). To the extent that changes in either Medicare or Medicaid regulations reduce eligibility or increase co-payments or deductible provisions, this pattern could be altered even with the growing numbers of physicians projected to be practicing in the 1980's and early 1990's.

It might be noted that additional technical matters are discussed in the appendix. Also, the historic trends have exhibited considerable variation along the trend. The model forecasts a smooth pattern in the future. It seems unlikely that, in the absence of major regulatory reform or different program management, these government programs would change their previous patterns. An alternative interpretation is that, in reaction to projected physician increases, market forces will stabilize the projected increases under the existing program management.

Figure 2.3


CONTROL FORECAST
REAL GOVERNMENT EXPENDITURES ON HOSPITAL SERVICES
RELATIVE EXPENDITURES (1967)
1.6
1.4
1.2
1.0
0.8
0.6
KEY
FORECAST
TREND
ACTUAL
54
59
63
67
71
75
79
83
87
90
TIME

2.4.10 Real Government Expenditures on Physician Services

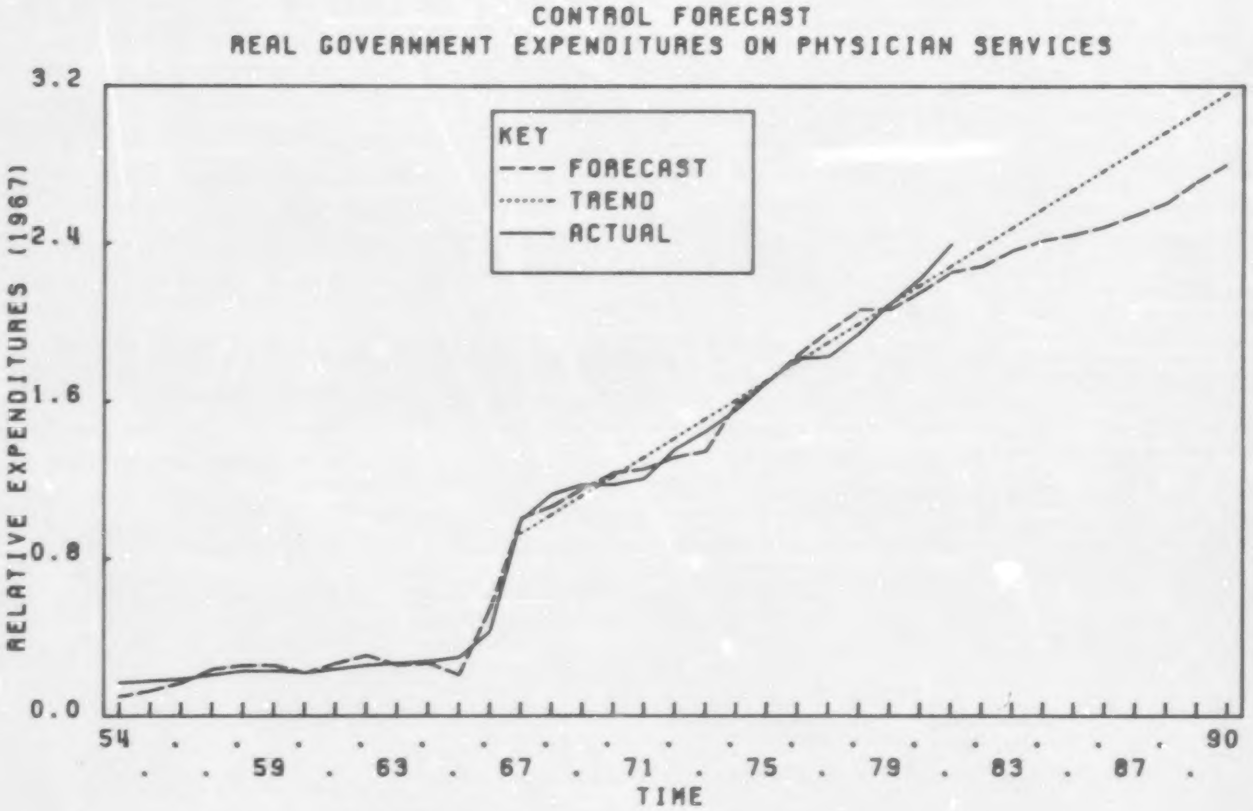
The impact of the increasing numbers of physicians on governmental expenditures is substantial. Inflation adjusted government expenditures on physician services is forecast to be substantially below their historic trend. As in the case of hospital services, government expenditures on physician services were stimulated by the introduction of Medicare and Medicaid.

In the period following Medicare, patterns of governmental expenditures on physician services have been relatively consistent. Most recently, this pattern has become an acceleration. The model forecasts increasing expenditures, but at a lower rate (see Figure 2.9).

The mechanisms used to achieve these results is discussed in the behavior section of this report. Some of the technical issues concerning the specification of this equation are discussed in the technical appendix. One point should be made here. The exact nature of how competition will be manifest is difficult to project. The methods used by providers will be limited only by their creativity and regulations. The government's response to this competition is also difficult to anticipate. To the extent that programs are developed to promote and use these competitive forces, cost savings will result.

It should also be noted that some of these future expenditures are determined, in part, by factors outside the program manager's discretion. Certainly Federal and State legislation determines broad and sometimes detailed program management aspects. These will certainly determine, in part, the impact of the projected physician increase on governmental expenditure levels. In addition, these expenditures are also counter cyclical in the sense that higher family income is associated with lower reliance on governmental health programs. The number of aged citizens was also found to be a significant factor in increasing expenditure levels. These are all factors that health care program mangers must respond to, rather than be responsible for. Nevertheless, it is the total response to these and other pressures that will determine whether the competitive forces generated by the increasing numbers of physicians can be utilized to reduce the government's health care costs.

Figure 2.9

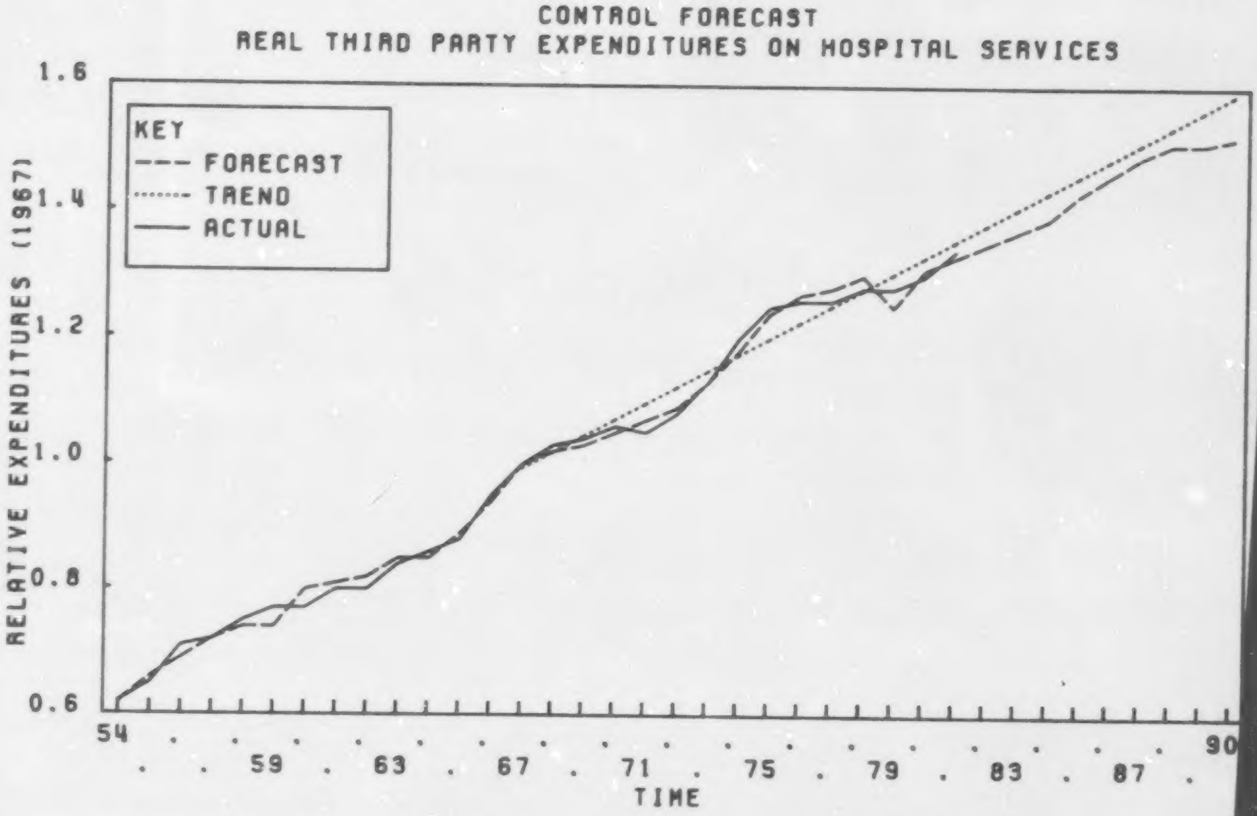

CONTROL FORECAST
REAL GOVERNMENT EXPENDITURES ON PHYSICIAN SERVICES
KEY
FORECAST
TREND
ACTUAL
RELATIVE EXPENDITURES (1967)
3.2
2.4
1.6
0.8
0.0
54
59
63
67
71
75
79
83
87
90
TIME

2.4.11 Real Third Party Expenditures on Hospital Services

Inflation adjusted third party expenditures are the sum of private insurance and governmental expenditures. Historically, these combined expenditures followed an irregular snake-like pattern common to some micro economic industry trends. A period of slow general expansion from 1954 to 1965 was followed by a rapid increase and slowing downturn in 1971. The pattern began to repeat, but the increase was more substantial and generated a very small downturn in 1977.

The model forecasts that real hospital expenditures will follow a trend roughly proportional to its post 1967 trend, but below it. Because the total is simply the arithmetic sum of its two components, little can be added to our previous discussion. However, we note that the primary cause of the slower growth trend is the moderated growth in the private sector rather than any decrease in the forecast of the public sector. Policy makers should certainly consider governmental actions in this light. The simultaneous nature of the health care sector necessitates that programs targeted for the government sector should be analyzed in terms of their impact on the private sector as well (see Figure 2.10).

Figure 2.10


CONTROL FORECAST
REAL THIRD PARTY EXPENDITURES ON HOSPITAL SERVICES
KEY
FORECAST
TREND
ACTUAL
RELATIVE EXPENDITURES (1967)
1.6
1.4
1.2
1.0
0.8
0.6
54
59
63
67
71
75
79
83
87
90
TIME

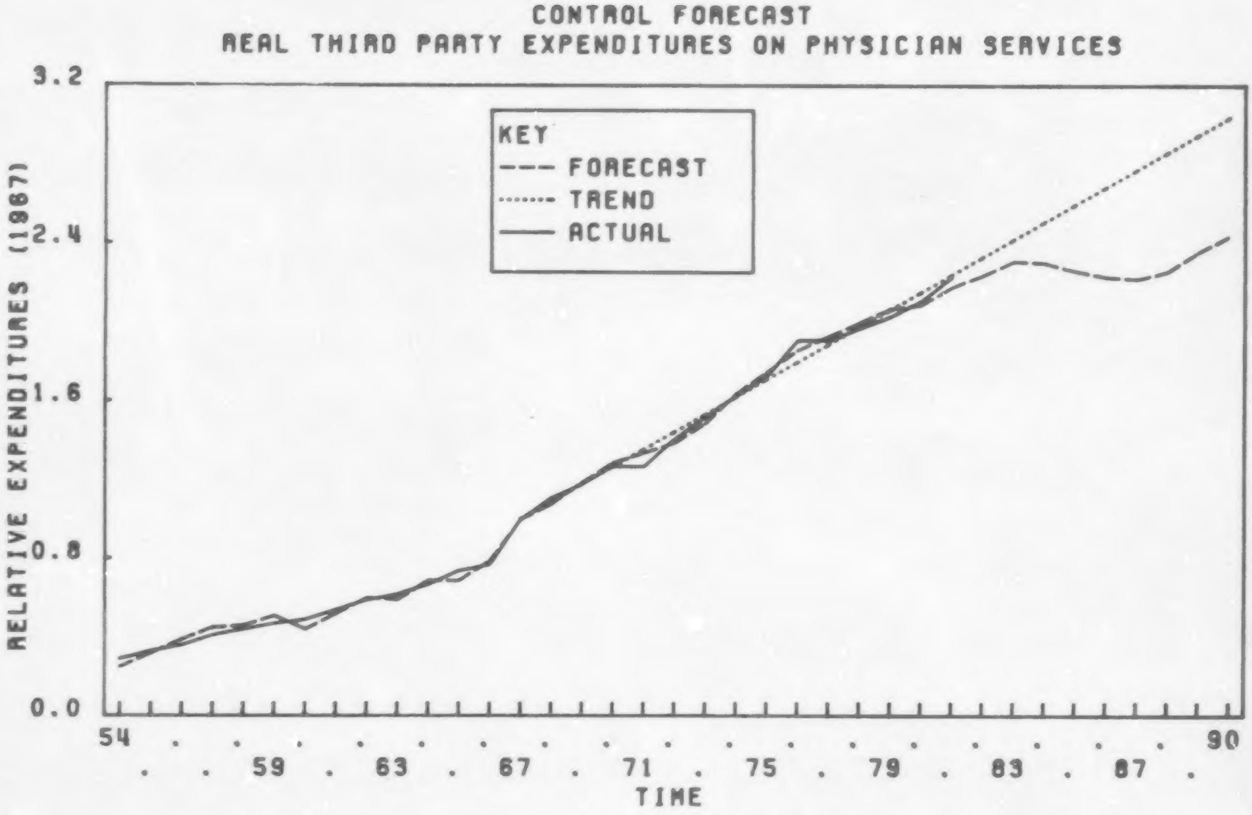
2.4.12 Real Third Party Expenditures on Physician Services

Inflation adjusted third party physician expenditures represent the sum of private insurance expenditures and government expenditures on this service. As in the case of hospital services, no separate explanation of this cost behavior outside of its components should be inferred. Also, the magnitude of the reduction in the trend escalation is primarily from reductions in the private insurance sector with a secondary, but important moderation of cost increases in the government sector.

In terms of historical perspective, this slowing of the acceleration and downturn is significant. However, this change is not of the magnitude to devastate the physician sector (see Figure 2.11). It is more in the nature of customary market adjustment found in other industries. This statement is qualified by the fact that the health care industry is not accustomed to market reactions. We expand on this issue in the behavior section.

It should be repeated that government programs to contain cost, promote competition, or utilize developing market forces should carefully consider the private insurance sector. Market forces take many years to develop in the health industry and it is important to understand these long-term interactions.

Figure 2.11


CONTROL FORECAST
REAL THIRD PARTY EXPENDITURES ON PHYSICIAN SERVICES
KEY
FORECAST
TREND
ACTUAL
RELATIVE EXPENDITURES (1967)
3.2
2.4
1.6
0.8
0.0
54
59
63
67
71
75
79
83
87
90
TIME

2.4.13 Real Direct or Out-Of-Pocket Expenditures on Hospital Services

Direct hospital expenditures are computed as a residual in the government data. They are, in effect, equal to total expenditures less third party payments. One implication is that any statistical error in either government or insured expenditures is added to the error in direct payments. We are concerned about direct payments for a number of reasons. One reason is that they amount to almost one third of the total health system's cost. Another important reason is that these data contain one part of the health sector that has considerable market activity. That subsector is expenditures by the uninsured. When we look at national time-series aggregate health data, direct payments cannot be eliminated without serious loss of the simultaneity of the system.

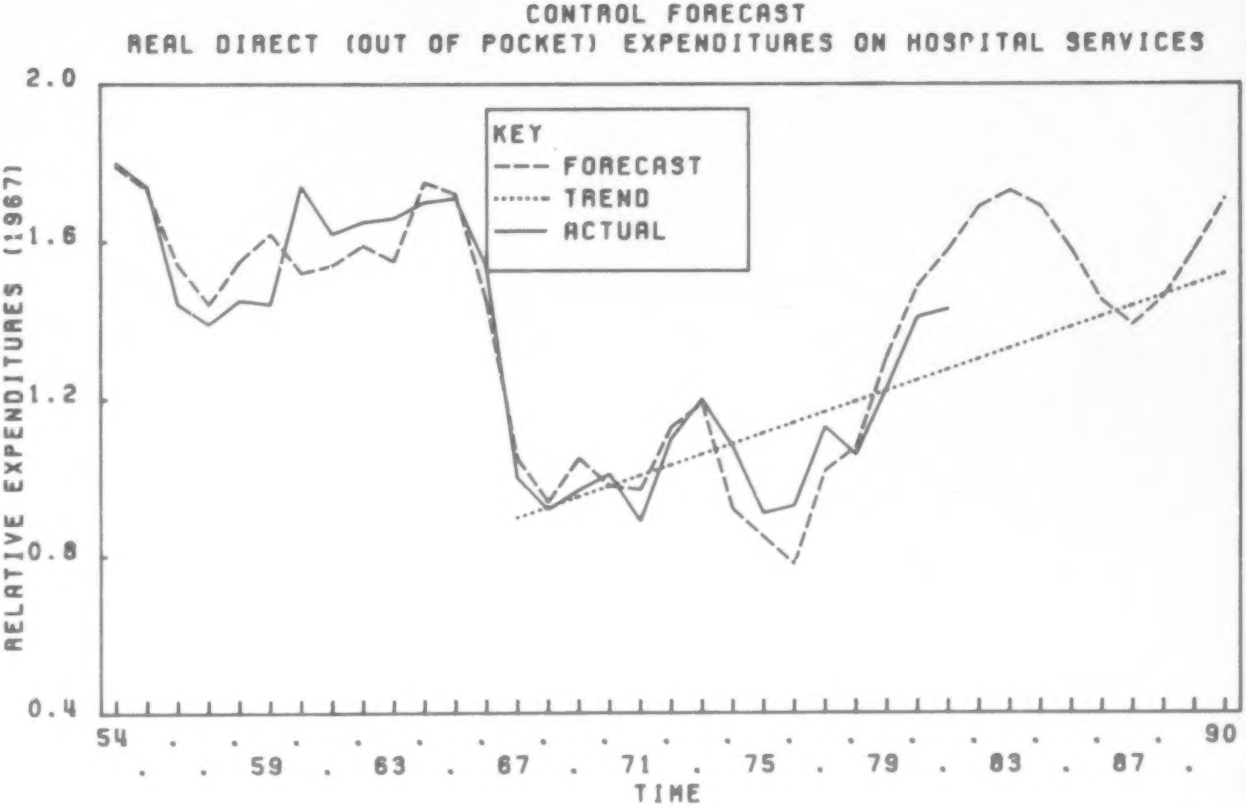
Inflation adjusted direct expenditures for hospital services include payments by both insured and uninsured individuals. It includes expenditures of the uninsured in the form of co-payments and deductibles that are associated with hospitalization. These payments would be highly correlated with private insurance expenditures. If these data were available separately, one would probably model them as a separate subsector, or include them with private insurance using techniques developed for public utility analysis, generally called two-part or multi-part tarrifs.

The second portion of direct expenditures includes hospital payments made by the uninsured. Unfortunately, a longitudinal data set on these data does not exist. These data, if they were available, could possibly shed light on how costs are borne in the absence of insurance. For long, extensive or intensive periods these costs could easily consume a wealthy family's savings. In these cases, it would be a matter of time in hospital, intensity of care and existing assets that would determine expenditures. When the assets were consumed, other family members, charitable institutions or the state would presumably fund continued treatment. The impact on total costs would depend on how costs were altered (if at all) when patients were transferred from one system to another.

The model forecasts that inflation adjusted direct expenditures on hospital services will continue their sharp escalation that began in 1978. This rapid escalation is forecast to continue to 1983, decrease to 1987 and increase again. The forecast path seems to have a lower bound equal to the post 1967 linear trend (see Figure 2.12).

One needs to carefully interpret these patterns. The major fall in out-of-pocket hospital expenditures was the result of the introduction of Medicare and Medicaid. The model forecast an increase in expenditures to approximately the pre-Medicare levels and then a fall to below the present levels. These predicted swings may be considerably greater than we actually will experience. The best interpretation may be to recognize that the model was developed to assess long-term trends rather than produce detailed forecasts. The general trend is for out-of-pocket expenses to increase and to return to their post Medicare-Medicaid levels. It might also be noted that in the absence of our experience in the last few years, one might argue that the trend was a horizontal line.

Figure 2.12


CONTROL FORECAST
REAL DIRECT (OUT OF POCKET) EXPENDITURES ON HOSPITAL SERVICES
KEY
FORECAST
TREND
ACTUAL
RELATIVE EXPENDITURES (1967)
2.0
1.6
1.2
0.8
0.4
54
59
63
67
71
75
79
83
87
90
TIME

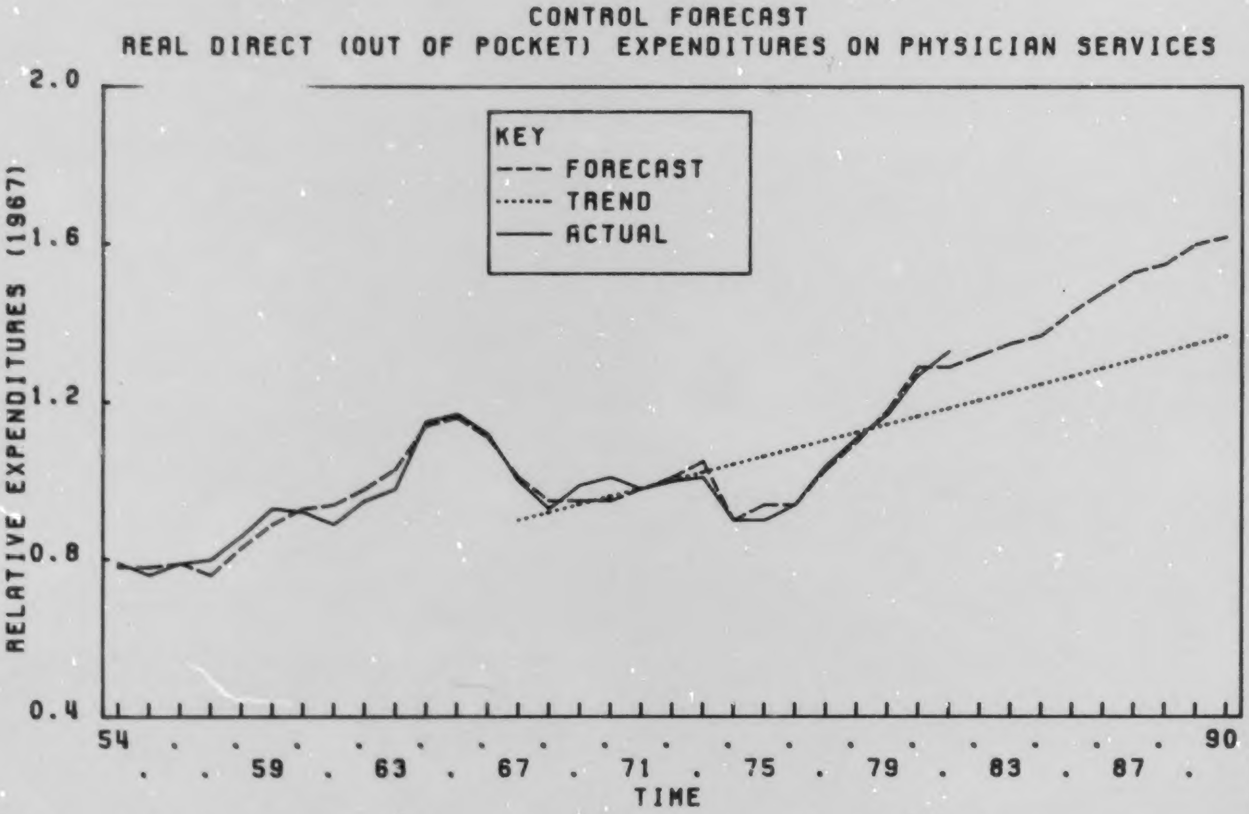
2.4.14 Real Direct Out-Of-Pocket Expenditures on Physician Services

Real direct expenditures for physician services are also computed in the raw data as a residual. As in the hospital case, this classification includes both co-payments and deductibles plus expenditures by those without insurance. In addition, new financing arrangements in the private sector may actually appear as direct payments in the official data, whereas in actuality they are insured payments by firms and other organizations who are, in effect, self-insuring their own employees.

The model forecasts an increasing level of direct expenditures. Although the level is predicted to be above the post 1967 linear trend, it is lower than the most current rapid increases. The impact of the projected increases in physians appears to moderate this most recent cost increase. In this regard, the results for direct expenditures follow the pattern established for other physician services. Competition, as used in orthodox economic analysis, is apparently having the conventional impact throughout the health care industry (see Figure 2.13).

In the insurance demand equation we found physician and hospital services to be substitutes. In direct expenditures they are complementary services. This is because, in planning health care expenditures, consumers, insurance firms and employers can choose between alternative services. Direct expenditures are a combination of co-payments, deductibles and uninsured expenses. Because of this, we find that a significant complementary relation exists. High hospitalization costs are associated with high physician expenditures. This is certainly true for many of those with extremely high health expenditures. Our disaggregation approach was able to disentangle the separate but opposite impacts of these two cost elements. The technical appendix contains further discussions about this aspect and other theoretical and econometric issues surrounding these cost impacts. The final section contains a discussion of the structural relations in the health care sector that influence the cost situation forecasted by their analysis. It also explains the potential impact of the projected increase in physicians upon the symbiotic relationship of physician behavior, access to and cost of medical care.

Figure 2.13


CONTROL FORECAST
REAL DIRECT (OUT OF POCKET) EXPENDITURES ON PHYSICIAN SERVICES

3.0 PHYSICIAN BEHAVIOR IN RESPONSE TO THE PROJECTED INCREASE IN NUMBERS OF PHYSICIANS

3.0 Introduction

In response to the increasing numbers of physicians, practicing physicians, hospitals and third party payers will compete. The net result of these individual or corporate actions is contained in our forecasts. How physicians will react is the subject of this section. In the next chapter, we discuss the impact that structure and behavior have on performance as measured by access.

Behavior is one component of market or industry conduct. Conduct denotes both strategy and tactics as well as behavior. Conduct implies action and change rather than a static condition. Our model forecasts change, but not radical change in the health care sector. It is the typical change one might expect in an industry faced with new competitive pressures and opportunities.

3.1 Pricing Behavior

We can see from Figure 3.1 that relative prices of physician services have not followed a smooth upward spiral. Rather, they have been subject to fluctuations and at least two major cycles. The first cycle began about 1957 and ended in 1974, and the second cycle began in 1974 and ended in 1980. We are currently in the up-trend, although the forecast is for a continuing downward pressure on physician prices. This is not an unusual pattern for an unadjusted econometric forecast. Its interpretation is that we should expect the current trend to be reversed, or that the new escalation will be less severe and of shorter duration than previously experienced. Also, the declining trend period would be of longer duration -- possibly four or five years as compared to recent reductions lasting about three years.

These relative price reductions do not necessarily imply an absolute decline in prices. Our forecasts compare physician prices to the general level of inflation. Strong pressures are being felt now and will have their direct impact in coming years, as the model seems to predict or lead the actual downturn by about a year or two.

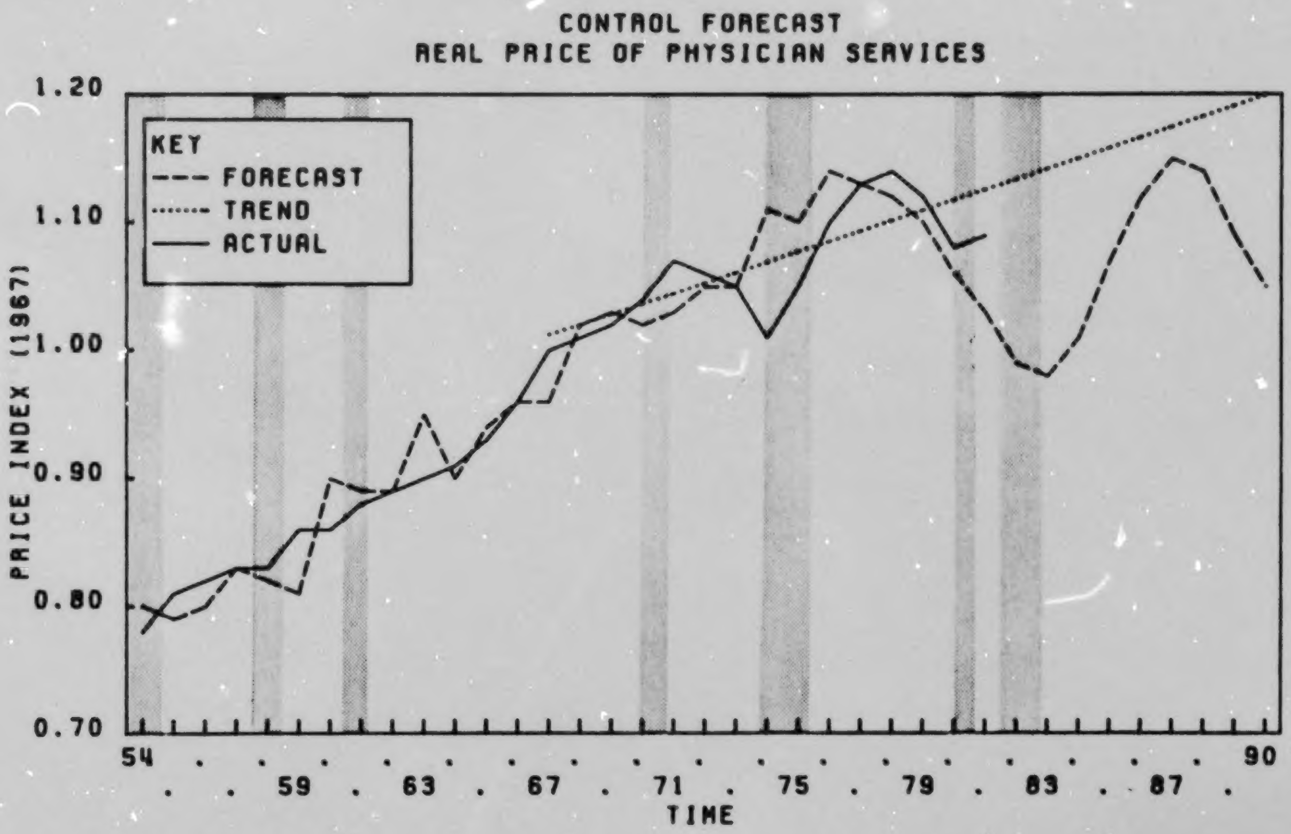
We have also superimposed shaded areas representing periods of recession as defined by the National Bureau of Economic Research on this figure. Little regularity can be found in the relative price behavior of physicians in previous recessions. This result is consistent with our findings concerning unemployment. Apparently the macro economic business cycle is not a major determinant of physician pricing behavior. In effect, the "built-in stabilizers" in the health care delivery system are reducing the impact of national economic conditions. Unfortunately, data are not available on the 1983 recession. While not particularly long by historical standards the recession was widespread and severe. These new data may tell a different story.

If we take a longer perspective than our econometric data allow, we note conditions in the 1930's and find market conditions resulting in substantial price reductions. These reductions were consistent with the reductions experienced by other service industries. Changes in the structure of modern medicine have changed that price flexibility. However, we note that new pro-competitive changes to the structure may reintroduce price flexibility into the system over time. One critical issue is how will government and other large reimbursement systems utilize the potential for price variability in containing costs.

We also superimposed shaded areas representing periods of recession onto the graph of hospital prices (see Figure 3.2). These data show less price variability than physician data, and one might not expect to detect any systematic impacts. This generally, is what we discovered. However, attention is drawn to the 1974 and 1981 recessions that included the troughs of the price cycle.

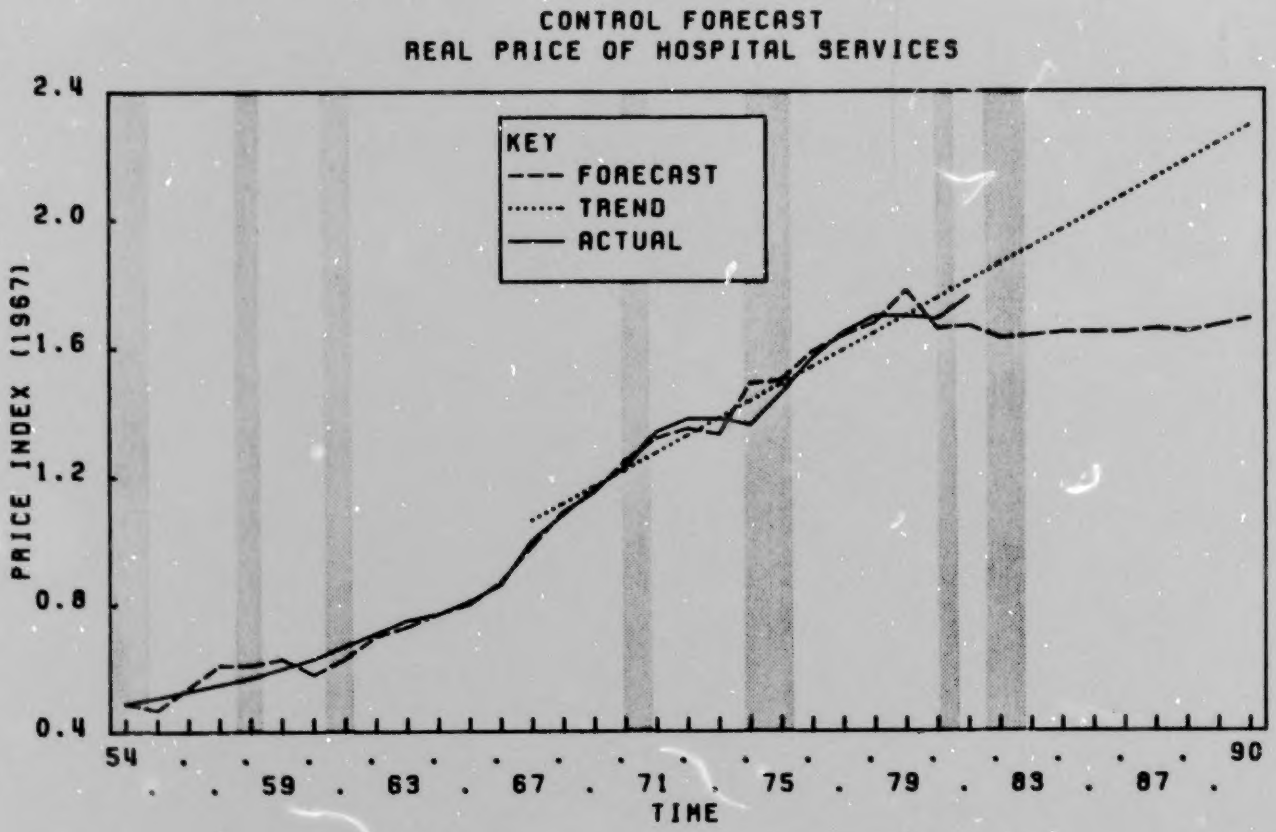
One cause could be that aggregate economic pressures restrain general prices, but the retrospective hospital reimbursement system has not focused the same competitive pressures on the hospital sector. As in physician pricing behavior, one would expect to find competitive responses to this situation being developed. One change consistent with our model would be the introduction of competitive bidding systems. We discuss this in the Synthesis chapter where other interrelations are also presented.

Figure 3.1



* Shaded periods indicate recessions as determined by the National Bureau of Economic Research.

Figure 3.2



* Shaded periods indicate recessions as determined by the National Bureau of Economic Research.

3.2 Forms of Competition

After price competition, a whole array of competitive strategies and tactics of physicians can be expected in an increasingly competitive market place. We will also discuss behaviors designed to reduce or lessen competition. In this section we will explain how the impact of the projected increase in the number of physicians will impact on physician behavior.

Increasing numbers of physicians will generate competitive pressures within the industry. This is the principal behavioral difference between physician behavior in the 1970's and our forecasts for the 1990's. This will lead to an expansion in the types and amounts of health services rendered for the whole spectrum of patient problems. The actual differences in behavior over time will be less influenced by specialties either complementing or competing, than by the intensity of competition in specific market areas. As competition intensifies, popular practice locations will become over doctored economically and newly trained physicians will seek better economic opportunities in less well served areas. Specialists will attempt to differentiate their services by a wide variety of promotional activities. This will occur at both the public and the professional levels. In effect, some specialists will develop and perfect more specific and detailed skills. They will become superspecialists. Others will generalize. Part of the generalization movement will be economically motivated. Also, research is expanding knowledge so that fields that were formerly the domain of one professional group will be considered suitable areas for two, three or more specialties in the future.

One result is that specialty patterns might be altered in fundamental ways in the 1990's. The first alteration is in the actual case mix specialists treat. More competition will tend to result in a bimodel distribution of technical skills. Within the specialties and subspecialties we expect to see further specialization. This will be particularly prevalent in major urban centers. Also, these urban centers with high physician densities, will contain specialists who are actually treating a wide variety of cases.

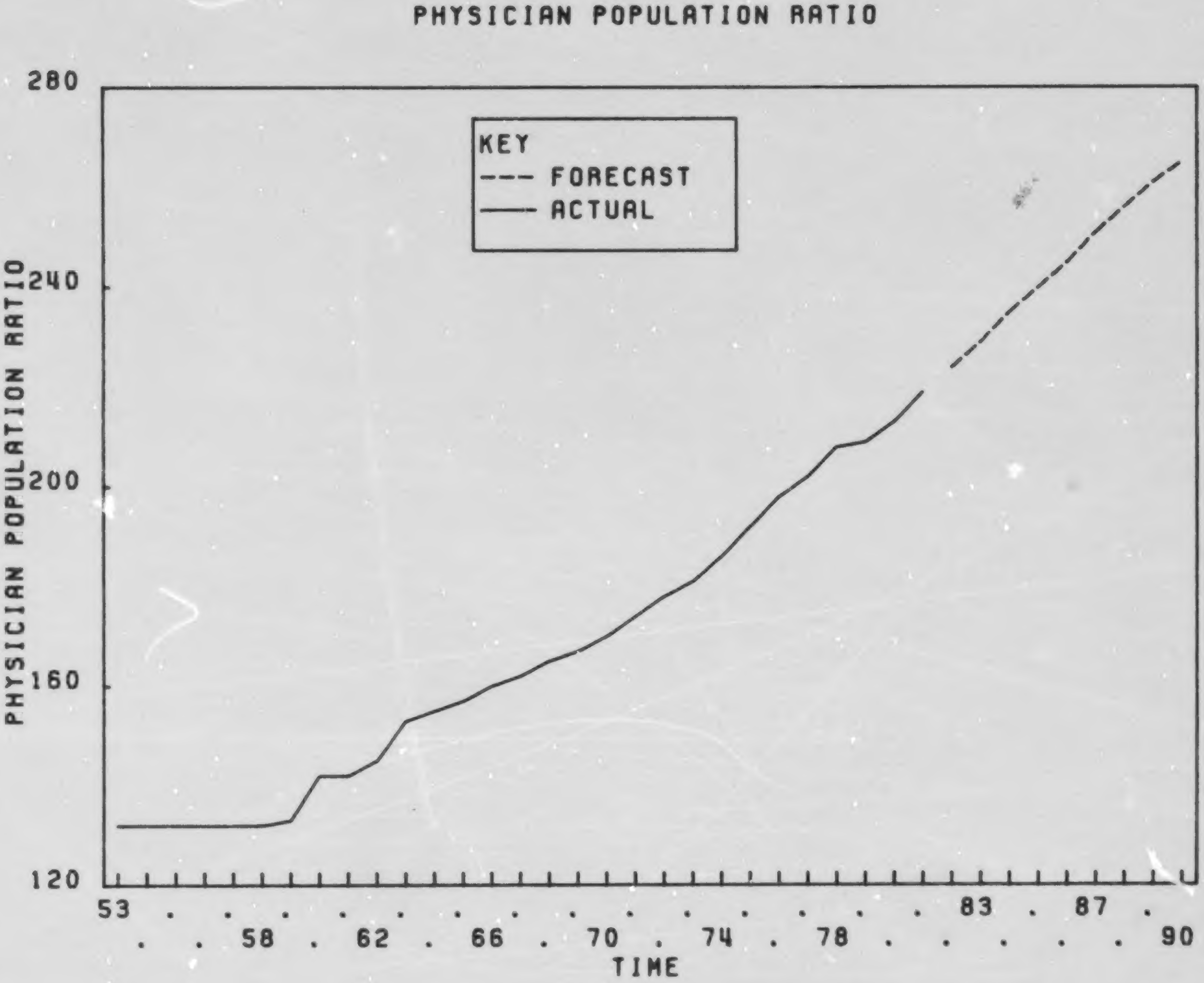
As the health industry changes in response to competition, it will have substantial influence on the supply of physicians and medical specialties. However, it takes a very long time for these changes in the industry to be seen in actual changes in the supply of physicians or specialists per se. Since there is considerable excess demand for medical school seats, one could anticipate that a considerable reduction in the overall attractiveness of medicine would have to occur before we saw a decrease in supply. This is, of course, predicated on voluntary actions of potential physicians. The economic conditions in the profession may generate pressures by physicians to reduce both seat size and number of residencies. This occurrence would be expected to occur prior to any vacancies in medical schools.

Specialties would be expected to change in one significant way. Over time, new physicians would expect to have more than one specialty in their medical careers. In addition to being more flexible concerning location, practice setting and a whole host of other practice elements, specialty change may become commonplace in the 1990's. Physicians would also be expected to receive training that would prepare them for these career changes. New educational programs would be expected to develop so that specialty change or augmentation could be achieved more easily than is currently possible. All of these modifications to physicians' current economic and practice behaviors will not occur smoothly, nor without intense debate within the profession.

Increases in physician availability are the forces that generate the stimulus for competition. They drive changes in the structure of the industry. They are the reason why the behavior of physicians change and they are the force that results in changes in access to health care. While the econometric model does not predict rapid, extensive or radical change by conventional industrial organization standards, the changes are new to health. Competition is becoming important because of both regulatory change and mounting pressures of more physicians. Figure 3.3 shows that the physician population ratio had been growing for 20 years. Competitive pressures have long incubation periods before they become evident and it takes equally long for market effects to be realized fully. For this reason, physician behavior may be more reactive and actions more drastic than is appropriate under the economic circumstances. It may be appropriate for both government and organized medicine to understand the nature of competition and present the facts. This seems preferable to some of the less considered positions predicting immediate and substantial change.

Finally, it should be noted that the exact way competition will be manifest is difficult to predict. Price and service competition along with changes in location are sure to occur. But the more sophisticated organizational changes and marketing innovations are functions of individual imagination. How the market will react to these innovations will determine the extent and impact of the changes.

Figure 3.3


PHYSICIAN POPULATION RATIO
KEY
--- FORECAST
—— ACTUAL
PHYSICIAN POPULATION RATIO
280
240
200
160
120
53
58
62
66
70
74
78
83
87
90
TIME

3.3 Attempts to Reduce Competition

A second set of reactions are predicted to be anti-competitive in nature. By anti-competitive actions, we do not mean physician fee fixing -- that is a per se violation of the Sherman Antitrust Act.[1] By anti-competitive actions we mean legal actions to insulate members of the industry from competition. One of the most direct methods is to modify existing laws that bar collective behavior in the health market. Earlier in 1983, we had the first evidence of this strategy where organized medicine sought blanket exemption from Federal Trade Commission jurisdiction of all professions. Rather than blanket exemption from all laws, we should add that, exemption from federal authority would be predicated on having the learned profession, including medicine, subject to state regulation and legislation. However, similar laws were proposed to exempt medicine from Justice Department jurisdiction and several state bills were introduced proposing parallel exemptions from state level antitrust laws.[2]

---

[1] *Arizona v. Maricopa County Medical Society*, 50 U.S.L.W. 4687 (U.S. June 18, 1982).

[2] Congressional Quarterly, Transportation and Commerce, May 21, 1983, p. 1019 and the weekly report, p. 846.

Other proposals will seek to achieve less sweeping changes. With state legislatures also seeking ways to reduce expenditures, one should expect to see proposals to reduce expenditures on medical education and a cut in medical school capacity. This is far from an immediate solution since it takes considerable time to see an impact in the market. A more immediate anti-competitive proposal would be to reduce residencies. This could be tailored to restrict entry of USFMG's, one of the fastest growing segments of the industry.

The remaining anti-competitive actions depend on the special circumstances of the community. In one geographic area, physicians may persuade a hospital to close a department, or have a totally closed staff.[3] In other communities physicians might seek ways to boycott hospitals, or third party payees and other physicians who are a competitive challenge. Unfortunately, physicians and hospitals are not generally familiar with antitrust law and many naive actions will likely be challenged in the courts. Physicians will have to change their behavior in these areas.

Three recent Supreme Court decisions reinforce the prediction that physicians will, by necessity, have to alter their behavior. The first case is the Maricopa case concerning price fixing.[4] The Maricopa physicians argued and some may have believed that because they were setting maximum rather than minimum fees the courts will allow the practice. The Supreme Court rejected the argument that the rule of reason could be applied. The Court declared the per se rule was appropriate and cost containment or pro-competition justifications were not admissible. This is exactly what any antitrust economist would have predicted, if the health care industry were to be treated like other industries. It was.

---

[3] It should be noted that not all health economists agree that closed staffing is consistent with anti-competitive behavior.

The second case, Blue Shield of Virginia v. McCready, expanded the scope of who could sue for damages in health case related antitrust litigation.[5] The Supreme Court ruled that a Blue Shield member could bring suit against Blue Shield for conspiring with physicians not to reimburse psychologists directly for treatment.

The third case, Union Labor Life Insurance Co. v. Pireno, reinforced the court's view that health insurers are not exempt from antitrust actions under the provision of the McCarren-Ferguson Act. That act protects state regulated insurance companies from certain federal antitrust actions that would otherwise be considered illegal boycotts. This particular case concerned voluntary peer review. The court held that voluntary peer review (and by inference other cost containment activities) are subject to antitrust scrutiny. Note that the peer review process was not declared to be a violation, in fact, earlier Justice Department rulings found that similar procedures did not violate the law. The court is simply confirming its general view. That view is that all elements of the business of medicine are subject to the antitrust laws.

---

[4] Ibid.

[5] Blue Shield of Virginia v. McCready, 50 U.S.L.W. 4723 (U.S. June 21, 1982).

Few, if any, special provisions for health care providers will be allowed. Furthermore, the Supreme Court position is that while a particular anti-competitive practice may be of immediate benefit to health care consumers, the long run benefit of competition to health care consumers is the paramount concern of social policy.

The future behavior of physicians should be clear. Mutual action by actual or potential competitors, be they physicians, hospitals, nursing homes, or third party reimbursers, will be challenged if they involve fees or costs. Hospitals and probably physicians will be obligated to behave as individuals rather than in concert with others. Certainly this will necessitate a fundamental re-evaluation of behaviors by physicians. Arguments to share markets, geographic areas or patients between or among competitors are a violation of the law. Horizontal integrations of hospitals that involve reductions in beds or service will be challenged. The efficiency or "rationalization" of the area's health care system may not be an acceptable defense. Groups of competitors such as hospitals, nursing homes or surgical centers could not boycott competing providers by refusing to deal with insurers or particular providers. The role of hospital councils and other ad hoc organizations will be subject to intense legal evaluation if they participate in price or cost decisions with third parties. It seems clear that physicians will have to be aware of these legal restrictions and change their behavior to compete in the marketplace of the future.

3.4 Behavior and Competition

Because behaviors are the actions that link the structure of the industry to the performance of the industry, we will discuss the details of physician behavior in the Synthesis chapter. But before we present that material, a brief discussion on the competition between hospitals and physicians is in order. Much of the current rivalry we see today is between providers and third party payers. These are arguments about all facets of reimbursement rather than competition. In actuality, they are like disputes within a large organization that has charge back or transfer prices. These are of the form "How much should one division pay for systems analysis or data processing performed by the corporate division of management information." Sometimes outside competition is mentioned, but the real decision seems to be an accounting question of how much it costs the supplying division and does the demanding division have the budget. There is little, if any, direct market economics here. We only have market economics if both suppliers and demanders have recourse to the outside market. In market economics, the internal bookkeeping issues of accounting for costs are not particularly interesting. In the charge back system they are everything.

The competitive behavior we have considered is concerned with outside competition. That competition is likely to be between providers. Two of the principal groups of providers are physicians as firms and hospitals as firms. This behavioral concept may need clarification. Physicians, for the most part, use hospitals as they would other cooperating factors such as a billing service, a receptionist or an examining table. The hospital is simply an economically efficient way to organize these resources. This is similar to a fully integrated accounting firm that has computers, preprinted forms, bookkeepers, CPAs, tax experts and the whole array of financial consultants.

However, just as these integrated accounting firms compete with individual or accounting partnerships, hospitals will compete with sole practitioners and group practices. Hospitals will employ physicians and open facilities that appear to patients as offering services competitive with those of other office based physicians. The interactions that these behavioral changes bring about may change many aspects of the delivery of health services. These changes are discussed in the Synthesis chapter.

4.0 PHYSICIAN SURPLUS AND ACCESS TO MEDICAL CARE

4.0 Introduction

In the health care literature we have a number of definitions of access. These definitions tend to be inconsistent from an economic perspective because they confound supply and demand for health services. These definitions are more consistent with social planning concepts than they are with market economic concepts. Because of the potential for miscommunication and unnecessary confusion, these definitions will be discussed at length.

As each alternative definition is discussed, the results of our research are discussed in relation to the separate concept of access. Since access is not a single uni-dimensional concept, a single answer to the question of future access to health care is difficult.

However, if we adopt a modified view of access, and adopt a modified definition of access, the question of future access seems to resolve itself. The modified definition of access is called "industry performance". Performance is far from a mechanical standard itself. It cannot be adopted or applied without considerable knowledge of the health care industry and understanding of economic analysis. Nevertheless, its adoption in applied work would allow a more consistent set of analytic tools, definitions and approaches to be used in health care research. Health care research could proceed in a parallel direction with industrial organization research. In this way, work done in health economics could be more directly comparable to orthodox research being conducted in the economics profession.

4.1 General Definition of Access to Health Care

One recently promulgated general definition of access is contained in a report of the President's Commission of Ethics Medical, Biomedical and Behavioral Research. The term "access to health care" implies that individuals encounter no excessive burdens in obtaining an adequate level of health care and that the costs associated with achieving such a state are distributed fairly. Burdens may include the costs of obtaining care, waiting and travel time, and the cost and availability of transport.[1]

This definition would seem to imply that an individual or community had or did not have "access" and that "access" was based on a subjective opinion of the evaluator.

---

[1] Securing Access to Health Care, President's Commission for the Study of Ethical Problems in Medicine, Biomedical and Behavioral Research, G.P.O., 1983.

If one accepts the general notion of access defined in this way, its measurement would be improved if it resulted in a continuum or spectrum of measured values of access rather than a binary result.

How could access be measured? Later we will discuss some of the proposed indicators of access. But before that discussion, it is important to note that the subjective nature of the term health care access virtually removes it from scientific inquiry. Other researchers will question the validity of this statement so we will pursue it briefly.

The basic question seems to be, "How is this industry doing and what could be done to improve the situation?" Unfortunately this question is one of the most difficult questions to answer for any industry. Economists have attempted to add some structure to this question. However, much more research is needed. One line of inquiry in health could be to determine if access to health care was different from other economic services. This is particularly relevant since we find the markets for hospital services and physician services to be reacting like other nonhealth markets would be expected to react in similar circumstances.

Does an individual in a county or metropolitan area have more difficulty obtaining a medical service (possibly defined as a DRG) that costs $200 on average nationally, than obtaining an auto engine tune-up that may have the same cost? Does a person have to travel farther to visit a physician or hospital than to visit a tax accountant or the Internal Revenue Office. Use of this comparative approach could abstract from the emotional issue of "how much health care is enough?"

If this less emotional, less subjective approach were adopted, considerable progress could be made. In this way the changing economic and demographic factors of an area could be considered in the context of changing medical or health care factors. The closing of a town's only hospital could be considered in the same way as the closing of the town's only bank. Health professionals may object and say that a hospital is more important than a bank, of course in a rural area farmers or ranchers may object as well. They might say -- "It's a question of life or death if you don't get emergency medical treatment, but you know you're dead if the banker lives in the next county." The result would not be to eliminate the subjectivity, but the result could be to establish an objective basis to measure how health access is different from access to other services.

This approach would also allow the comparison across areas. That is, one could compare one rural area with another and rural areas to nonrural areas. Again, we need to emphasize that in actual situations there is no absolute standard (other than perhaps, that all prices should be equal to their respective full marginal costs -- including externalities). Because of this, comparative analysis would yield much more useful policy information concerning the impact of other governmental programs and the impact of the forecasted increasing numbers of physicians.

Using comparative analysis, one could see how a particular group of rural communities differed from others. All rural communities have reduced access to almost all economic and governmental services. In effect, this is the definition of being rural. One policy issue is, how does health differ from all other privately and governmentally provided services. The differential could be related to cultural, ethnic, economic or geographic factors. What would be at issue is how these special circumstances influence the health care industry differently from other service industries -- including the provision of government services. Until the less subjective, more objective comparative methodology is widely adopted, the more traditional methods will remain the center of interest. Of these, financial access is the most objective measure of access, but in actual use, it contains substantial subjectivity and some confounding of supply and demand. Geographic access is the second label for a broad set of concerns. These concerns clearly confound the impact of changes in supply and changes in demand. In the next section these issues will be discussed in the context of the impact of the projected physician surplus.

4.2 Financial Access and the Projected Physician Surplus

4.2.1 Price Indicies

Our research focused upon hospital services and physician services at the national level. Because our results are consistent with orthodox economic analysis, we can extrapolate from our model to the issues generally considered to be central to the financial access question. Our results tend to show that the increase in numbers of physicians will increase access to both hospital care and to physician care. More practicing doctors will produce more health care. Competition within the health care industry will retard the acceleration of both hospital and physician prices. However, both physician and hospital price indices are forecast to exceed the general price level throughout the 1980's. Table 4.1 shows the actual and projected annual increases in the forecast of the relative physician service price index and Table 4.2 shows the growth in the relative hospital service price index. These annual price changes are one indication of financial access. The model indicates that the projected increase in numbers of physicians will reduce the annual price escalation in physician services from an average annual acceleration of about 0.43 percent per year (from 1970 to 1980) to a projected decreasing rate of -0.36 per year from 1980 to 1990. That is, from approximately 1.04 in 1970 to 1.09 in 1980, and 1.05 in 1990. Of course, there is a dramatic cycle in this latter forecast period as the table indicates. Hospital prices show a dramatic slowing of price acceleration from 3.21 percent between 1970 and 1980 to an almost flat -0.02 from 1980 to 1990. However, hospital prices continue to be increasing at a rate two-thirds faster than the general inflation rate. It is the acceleration that has been controlled, not the absolute level of cost. However, it should be carefully noted that we have not modeled the impact of DRG's or other changes to the hospital reimbursement system. After the budget neutrality period, these regulatory changes could have significant impacts.

Table 4.1 COMPOUND RATES OF CHANGE IN THE PHYSICIAN SERVICE PRICE INDEX

@PRICE YEARS

YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1955	1.87																																			
1956	.70	1.54																																		
1957	2.03	1.13	.71																																	
1958	1.69	.92	.69	.67																																
1959	1.95	1.35	1.20	1.57	2.47																															
1960	1.69	1.26	1.19	1.35	1.69	.91																														
1961	1.67	1.31	1.26	1.40	1.65	1.24	1.57																													
1962	1.60	1.30	1.35	1.40	1.60	1.42	1.67	1.70																												
1963	1.61	1.33	1.30	1.40	1.54	1.31	1.44	1.30	.99																											
1964	1.57	1.31	1.29	1.37	1.40	1.29	1.30	1.32	1.10	1.20																										
1965	1.60	1.37	1.35	1.43	1.54	1.39	1.40	1.46	1.36	1.54	1.00																									
1966	1.70	1.50	1.50	1.59	1.70	1.59	1.71	1.74	1.73	1.97	2.36	2.04																								
1967	1.80	1.71	1.73	1.83	1.76	1.90	2.04	2.12	2.19	2.49	2.93	3.45	4.07																							
1968	1.84	1.69	1.70	1.79	1.90	1.84	1.95	2.01	2.05	2.26	2.53	2.74	2.70	1.34																						
1969	1.81	1.67	1.68	1.76	1.86	1.80	1.90	1.94	1.96	2.13	2.31	2.42	2.20	1.40	1.46																					
1970	1.80	1.66	1.67	1.74	1.83	1.77	1.86	1.89	1.91	2.04	2.10	2.24	2.09	1.44	1.49	1.52																				
1971	1.84	1.71	1.72	1.80	1.88	1.84	1.92	1.96	1.98	2.10	2.23	2.29	2.10	1.71	1.63	2.01	2.51																			
1972	1.72	1.60	1.60	1.66	1.73	1.60	1.74	1.76	1.75	1.84	1.92	1.93	1.77	1.32	1.32	1.27	1.14	-.21																		
1973	1.56	1.44	1.43	1.40	1.53	1.46	1.51	1.50	1.47	1.52	1.56	1.52	1.33	.80	.79	.62	.33	-.75	-1.20																	
1974	1.38	1.17	1.15	1.17	1.21	1.12	1.14	1.10	1.05	1.05	1.04	.94	.71	.24	.06	-.22	-.65	-1.60	-2.41	-3.53																
1975	1.40	1.20	1.26	1.29	1.33	1.26	1.20	1.26	1.22	1.24	1.25	1.10	1.00	.62	.52	.36	.13	-.45	-.83	-.16	3.34															
1976	1.57	1.46	1.46	1.50	1.54	1.47	1.52	1.52	1.50	1.54	1.57	1.54	1.41	1.12	1.09	1.04	.96	.65	.87	1.60	4.27	5.21														
1977	1.62	1.51	1.51	1.55	1.60	1.35	1.59	1.59	1.58	1.62	1.65	1.63	1.53	1.27	1.27	1.24	1.20	.99	1.23	1.86	3.73	3.93	2.66													
1978	1.57	1.48	1.47	1.51	1.55	1.50	1.54	1.54	1.52	1.56	1.50	1.56	1.45	1.22	1.20	1.10	1.13	.94	1.13	1.62	2.95	2.02	1.65	.65												
1979	1.44	1.34	1.33	1.36	1.39	1.34	1.36	1.35	1.32	1.35	1.36	1.32	1.20	.97	.93	.80	.81	.60	.71	1.05	1.99	1.66	.50	-.56	-1.75											
1980	1.27	1.17	1.15	1.17	1.19	1.13	1.14	1.12	1.09	1.09	1.00	1.03	.90	.66	.61	.53	.43	.20	.26	.48	1.16	.73	-.36	-1.34	-2.32	-2.09										
1981	1.25	1.15	1.13	1.15	1.17	1.11	1.12	1.10	1.07	1.07	1.06	1.01	.89	.67	.62	.55	.46	.25	.31	.51	1.10	.73	-.14	-.83	-1.32	-1.11	.71									
1982	.86	.75	.72	.72	.73	.65	.64	.59	.54	.51	.47	.39	.24	-.01	-.11	-.22	-.37	-.63	-.67	-.60	-.23	-.73	-1.60	-2.53	-3.11	-3.02	-4.20	-9.02								
1983	.79	.68	.65	.68	.64	.57	.55	.51	.45	.42	.38	.29	.15	-.09	-.19	-.31	-.44	-.69	-.73	-.68	-.35	-.80	-1.63	-2.33	-2.92	-3.21	-3.32	-5.27	-1.35							
1984	.87	.77	.75	.75	.75	.60	.67	.63	.50	.56	.53	.46	.33	.11	.04	-.06	-.17	-.37	-.39	-.30	.02	-.34	-1.01	-1.52	-1.80	-1.91	-1.66	-2.44	1.03	3.40						
1985	1.01	.92	.90	.90	.91	.85	.85	.82	.70	.77	.75	.69	.50	.39	.33	.26	.10	.02	.03	.14	.49	.21	-.34	-.76	-.90	-.75	-.32	-.57	2.41	4.35	5.22					
1986	1.13	1.05	1.03	1.04	1.06	1.00	1.01	.98	.95	.95	.94	.89	.80	.63	.59	.54	.40	.34	.30	.51	.86	.63	.19	-.08	-.10	.05	.55	.52	3.06	4.57	5.12	5.01				
1987	1.17	1.09	1.08	1.09	1.10	1.05	1.06	1.04	1.01	1.01	1.00	.96	.80	.72	.69	.64	.59	.47	.52	.65	.90	.70	.39	.17	.11	.38	.82	.04	2.93	4.03	4.22	3.72	2.44			
1988	1.12	1.03	1.02	1.03	1.04	.99	.99	.97	.94	.94	.93	.89	.80	.65	.61	.57	.52	.40	.44	.55	.85	.66	.30	.08	.03	.23	.62	.61	2.31	3.06	2.96	2.21	.04	-.70		
1989	.94	.86	.84	.84	.85	.79	.79	.76	.72	.71	.69	.64	.55	.39	.35	.29	.23	.10	.12	.21	.47	.26	-.11	-.33	-.42	-.29	.00	-.00	1.26	1.70	1.35	.41	-1.00	-2.00	-4.01	
1990	.82	.73	.71	.71	.71	.65	.64	.61	.57	.55	.53	.47	.38	.22	.17	.11	.04	-.09	-.08	-.01	.21	.01	-.36	-.58	-.69	-.59	-.36	-.47	.65	.94	.82	-.39	-1.70	-3.04	-4.17	-3.52

Annual Average Compound Growth Rates

Year to year average annual compound growth rates are shown as the last number in each row. For example, to find the average annual compound growth rate from 1970 to 1971, select the row which has the year 1971. The last number of this row is the compound growth rate between years 1970 and 1971.

To find the average annual compound growth rate between an initial and a final year, locate the row indicating the final year then move along the columns to the column indicating the initial year. For example, to find the average annual compound growth rate between the years 1967 and 1980, locate the row indicating the year 1980, then move along the column to the 14th column with the header year 1967. This number is the average annual compound growth rate between the years 1967 and 1980.

Table 4.2 COMPOUND RATES OF CHANGE IN THE HOSPITAL SERVICE PRICE INDEX

YEARS									%PRICE YEARS																	YEARS									
	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1955	5.19																																			
1956	4.47	3.75																																		
1957	4.41	4.02	4.29																																	
1958	4.03	3.65	3.60	2.91																																
1959	4.18	3.91	3.99	3.83	4.76																															
1960	4.34	4.17	4.28	4.27	4.95	5.14																														
1961	4.65	4.56	4.73	4.84	5.49	5.85	6.56																													
1962	4.81	4.76	4.92	5.05	5.59	5.87	6.23	5.91																												
1963	4.84	4.79	4.94	5.05	5.48	5.66	5.84	5.48	5.04																											
1964	4.71	4.66	4.77	4.84	5.16	5.24	5.27	4.84	4.30	3.57																										
1965	4.64	4.59	4.68	4.73	5.00	5.03	5.01	4.63	4.21	3.79	4.01																									
1966	4.81	4.77	4.88	4.94	5.20	5.26	5.28	5.02	4.80	4.72	5.30	6.61																								
1967	5.61	5.64	5.82	5.97	6.32	6.51	6.71	6.73	6.98	7.37	8.67	11.07	15.71																							
1968	5.82	5.87	6.05	6.21	6.55	6.75	6.95	7.00	7.19	7.62	8.66	10.25	12.12	8.64																						
1969	5.92	5.97	6.14	6.29	6.61	6.79	6.98	7.03	7.19	7.56	8.37	9.49	10.46	7.93	7.22																					
1970	5.93	5.98	6.15	6.29	6.58	6.74	6.90	6.94	7.07	7.36	8.01	8.83	9.39	7.36	6.72	6.22																				
1971	6.09	6.15	6.31	6.46	6.74	6.90	7.06	7.11	7.25	7.53	8.10	8.80	9.24	7.68	7.37	7.44	8.67																			
1972	5.93	5.98	6.12	6.24	6.48	6.61	6.74	6.75	6.84	7.04	7.48	7.99	8.22	6.78	6.31	6.01	5.91	3.22																		
1973	5.62	5.64	5.75	5.84	6.04	6.13	6.21	6.18	6.20	6.32	6.63	6.96	7.01	5.63	5.04	4.50	3.93	1.64	.08																	
1974	5.23	5.23	5.32	5.38	5.53	5.59	5.62	5.55	5.52	5.56	5.76	5.96	5.87	4.54	3.87	3.21	2.47	.48	-.85	-1.70																
1975	5.33	5.34	5.42	5.49	5.64	5.70	5.73	5.67	5.66	5.71	5.90	6.09	6.04	4.89	4.36	3.89	3.43	2.16	1.81	2.69	7.36															
1976	5.43	5.44	5.53	5.60	5.75	5.80	5.85	5.80	5.79	5.85	6.04	6.23	6.19	5.18	4.76	4.41	4.11	3.22	3.22	4.29	7.46	7.56														
1977	5.40	5.41	5.49	5.55	5.69	5.75	5.78	5.73	5.72	5.77	5.94	6.10	6.06	5.14	4.75	4.45	4.20	3.47	3.52	4.40	6.55	6.14	4.75													
1978	5.31	5.31	5.38	5.44	5.56	5.61	5.63	5.58	5.56	5.59	5.74	5.87	5.81	4.95	4.59	4.30	4.07	3.42	3.46	4.15	5.69	5.13	3.94	3.16												
1979	5.09	5.09	5.15	5.19	5.30	5.32	5.33	5.27	5.23	5.24	5.35	5.45	5.36	4.54	4.17	3.87	3.62	3.00	2.97	3.46	4.54	3.85	2.64	1.60	.08											
1980	4.88	4.87	4.91	4.94	5.03	5.05	5.04	4.96	4.91	4.90	4.98	5.05	4.94	4.15	3.79	3.48	3.21	2.62	2.55	2.90	3.71	2.99	1.88	.94	-.14	-.35										
1981	4.85	4.83	4.88	4.90	4.99	5.00	4.99	4.92	4.86	4.85	4.93	4.99	4.88	4.15	3.81	3.53	3.29	2.76	2.71	3.05	3.76	3.17	2.31	1.71	1.24	1.83	4.06									
1982	4.39	4.36	4.38	4.38	4.44	4.43	4.40	4.30	4.22	4.17	4.21	4.22	4.07	3.34	2.97	2.65	2.36	1.80	1.66	1.84	2.30	1.60	.63	-.17	-.98	-1.33	-1.81	-7.35								
1983	4.25	4.21	4.23	4.23	4.28	4.26	4.22	4.12	4.03	3.98	4.01	4.01	3.85	3.15	2.80	2.49	2.21	1.69	1.55	1.70	2.09	1.45	.61	-.06	-.69	-.89	-1.06	-3.53	.45							
1984	4.12	4.08	4.10	4.09	4.14	4.11	4.07	3.96	3.87	3.82	3.83	3.82	3.67	3.00	2.66	2.36	2.09	1.60	1.46	1.59	1.93	1.35	.60	.02	-.49	-.60	-.67	-2.19	.49	.53						
1985	4.00	3.96	3.96	3.95	3.99	3.96	3.91	3.81	3.72	3.66	3.66	3.64	3.49	2.85	2.52	2.23	1.97	1.51	1.38	1.48	1.79	1.25	.57	.06	-.38	-.45	-.47	-1.57	.43	.42	.31					
1986	3.87	3.83	3.83	3.81	3.84	3.81	3.76	3.65	3.56	3.49	3.49	3.46	3.31	2.69	2.37	2.09	1.84	1.40	1.27	1.37	1.63	1.13	.51	.05	-.33	-.39	-.40	-1.27	.31	.27	.14	-.03				
1987	3.77	3.72	3.72	3.70	3.73	3.70	3.64	3.53	3.44	3.37	3.36	3.33	3.18	2.59	2.28	2.01	1.77	1.35	1.23	1.31	1.56	1.09	.52	.11	-.23	-.26	-.25	-.95	.38	.36	.31	.30	.64			
1988	3.63	3.59	3.58	3.56	3.58	3.54	3.48	3.37	3.27	3.20	3.19	3.15	3.00	2.43	2.13	1.87	1.63	1.23	1.11	1.18	1.39	.95	.41	.03	-.28	-.31	-.31	-.92	.20	.14	.05	-.04	-.04	-.72		
1989	3.57	3.52	3.52	3.49	3.51	3.47	3.41	3.30	3.21	3.14	3.12	3.08	2.93	2.38	2.10	1.85	1.62	1.24	1.13	1.19	1.40	.98	.49	.15	-.12	-.14	-.12	-.63	.37	.36	.32	.33	.45	.35	1.43	
1990	3.49	3.44	3.44	3.41	3.43	3.38	3.32	3.21	3.12	3.05	3.03	2.99	2.84	2.32	2.04	1.80	1.58	1.22	1.11	1.17	1.36	.97	.52	.20	-.04	-.05	-.02	-.47	.43	.42	.41	.43	.54	.51	1.11	.82

4.2.2 Insurance

Access is often discussed in terms of medical insurance. In one regard this is certainly correct considering that private insurance accounts for 26.2 percent of all expenditures in the health care system. When government programs, considered by some to be public insurance, are added to this category then the share grows to 67.9 percent. However, our findings are consistent with the theory that insurance is a product of the tax system and not the health system. In effect, the government subsidizes the purchase of insurance by allowing firms to pay their employees in tax free health insurance rather that in taxable income.

5

Due to the recently ended 1982 recession, new concern has been voiced pertaining to the reduced access resulting from unemployment.[2] Our analysis does not include this most recent period, however, we attempted to include unemployment in our model. It was not found to be a significant factor influencing access as measured by insurance expenditures. One would expect that loss of insurance coverage would reduce consumption of health services rather than eliminate it. Loss of income and loss of the tax subsidy would both push in the direction of reduced expenditures. However, with the large number of multi-earner households, unemployment of one family member does not necessarily mean loss of coverage. With this adjustment, a recent Robert Wood Johnson Foundation funded study found between three and four million unemployed workers, plus 2.5 to three family members for a total of 5.5 to seven million people, were without insurance for this reason.[3] This amounts to about 26 percent of the uninsured.

---

[2] The recession ended in November 1982 according to the National Bureau of Economic Research, Business Conditions Digest, Department of Commerce, August, 1983.

The largest component of the uninsured is the working uninsured who, including their families, number between 12 and 15.5 million people. They account for about 57 percent of all those who are uninsured. The remainder are those not in the labor force. Many of these people would be eligible for health care under public programs. Our concern was to determine how access would be influenced by the increasing number of physicians and also include or hold constant the impact of unemployment. We were not able to detect an impact of unemployment on insurance expenditures and were thus not able to determine the effect of increased physicians on the situation.

---

[3] Robert Wood Johnson Foundation, Access to Care Study, Number 2, Special Report, 1983.

Generally we found that insurance expenditures were closely linked to the tax system and the other orthodox economic factors. Medicare and Medicaid reduced reliance on private insurance and increased disposable income was a major determinant of financial access, as measured by insurance expenditures. In this sense prices are serving their conventional role of rationing the limited health care resources. Tables 4.3 and 4.4 show the compound rate of change private insurance expenditures for physician services and hospital services.

Table 4.3 COMPOUND RATES OF CHANGE IN PRIVATE INSURANCE EXPENDITURES FOR PHYSICIAN SERVICES

[illegible] YEARS

[illegible] YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1955	12.50																																			
1956	12.80	12.46																																		
1957	12.66	12.76	11.01																																	
1958	11.01	10.52	9.57	6.22																																
1959	10.73	10.29	9.57	7.09	9.59																															
1960	10.06	9.50	8.00	7.53	8.19	6.01																														
1961	10.05	9.46	9.09	8.13	8.77	8.36	9.94																													
1962	9.76	9.30	8.07	8.06	8.52	8.17	8.86	7.70																												
1963	9.30	8.91	8.41	7.66	7.95	7.55	7.00	6.74	5.71																											
1964	9.37	9.03	8.60	7.99	8.20	8.03	8.33	7.00	7.01	9.95																										
1965	9.42	9.12	8.76	8.23	8.53	8.35	8.66	8.34	8.53	9.96	9.90																									
1966	8.29	7.92	7.47	6.07	6.95	6.50	6.54	5.00	5.41	5.31	3.06	-3.43																								
1967	7.50	7.10	6.71	6.10	6.09	5.66	5.49	4.77	4.10	3.00	1.02	-2.03	-.61																							
1968	7.78	7.30	6.97	6.43	6.45	6.11	6.03	5.40	5.10	4.90	3.77	1.70	4.40	9.03																						
1969	7.76	7.43	7.05	6.57	6.60	6.31	6.25	5.00	5.52	5.49	4.62	3.32	5.67	8.96	8.10																					
1970	8.00	7.79	7.47	7.05	7.12	6.90	6.91	6.50	6.43	6.53	5.97	5.19	7.46	10.29	10.52	13.00																				
1971	7.49	7.19	6.84	6.42	6.43	6.17	6.11	5.74	5.51	5.49	4.87	4.04	5.60	7.21	6.35	5.49	-1.52																			
1972	7.65	7.37	7.06	6.60	6.71	6.49	6.47	6.15	5.99	6.02	5.54	4.93	6.39	7.04	7.35	7.10	4.27	10.41																		
1973	7.67	7.40	7.11	6.75	6.79	6.59	6.50	6.30	6.17	6.21	5.81	5.29	6.60	7.05	7.46	7.31	5.47	9.15	7.92																	
1974	7.62	7.37	7.10	6.76	6.79	6.61	6.60	6.34	6.22	6.27	5.91	5.47	6.63	7.71	7.36	7.21	5.81	8.30	7.30	6.04																
1975	7.45	7.20	6.93	6.60	6.62	6.44	6.42	6.17	6.05	6.07	5.73	5.31	6.33	7.23	6.87	6.66	5.44	7.25	6.22	5.30	3.94															
1976	7.72	7.49	7.25	6.96	7.00	6.85	6.85	6.64	6.56	6.63	6.36	6.03	7.03	7.91	7.60	7.62	6.74	8.40	8.00	8.03	8.63	13.53														
1977	7.32	7.09	6.84	6.54	6.56	6.39	6.37	6.15	6.04	6.06	5.77	5.43	6.27	6.99	6.67	6.50	5.60	6.03	6.13	5.69	5.31	6.01	-1.02													
1978	7.05	6.82	6.57	6.27	6.27	6.10	6.06	5.84	5.72	5.72	5.42	5.00	5.82	6.43	6.09	5.87	5.01	5.90	5.26	4.74	4.22	4.31	-.07	.99												
1979	6.76	6.52	6.27	5.90	5.96	5.79	5.73	5.50	5.37	5.35	5.05	4.71	5.36	5.87	5.52	5.27	4.44	5.21	4.49	3.93	3.36	3.21	-.02	.40	-.02											
1980	6.60	6.37	6.17	5.83	5.81	5.64	5.50	5.35	5.22	5.19	4.90	4.57	5.17	5.62	5.20	5.03	4.26	4.93	4.26	3.75	3.24	3.10	.65	1.21	1.32	2.60										
1981	6.49	6.27	6.03	5.75	5.73	5.55	5.50	5.20	5.15	5.12	4.84	4.53	5.00	5.50	5.17	4.93	4.23	4.82	4.22	3.76	3.33	3.23	1.20	1.06	2.16	3.26	3.05									
1982	6.43	6.21	5.90	5.71	5.69	5.52	5.46	5.25	5.13	5.10	4.83	4.54	5.06	5.45	5.14	4.92	4.27	4.81	4.27	3.87	3.51	3.44	1.05	2.43	2.80	3.76	4.10	4.75								
1983	6.29	6.07	5.84	5.57	5.55	5.30	5.32	5.12	4.99	4.95	4.70	4.41	4.89	5.25	4.95	4.73	4.12	4.60	4.09	3.71	3.37	3.30	1.91	2.41	2.70	3.39	3.63	3.52	2.30							
1984	6.00	5.70	5.55	5.20	5.25	5.00	5.00	4.79	4.66	4.61	4.35	4.06	4.50	4.80	4.50	4.26	3.66	4.07	3.56	3.10	2.82	2.69	1.41	1.77	1.90	2.20	2.10	1.63	.11	-2.03						
1985	5.66	5.44	5.21	4.94	4.89	4.71	4.63	4.41	4.27	4.21	3.94	3.65	4.03	4.30	3.90	3.73	3.14	3.40	2.96	2.56	2.10	2.01	.80	1.03	1.04	1.21	.92	.20	-1.27	-3.00	-3.96					
1986	5.35	5.13	4.89	4.62	4.57	4.30	4.29	4.07	3.92	3.84	3.57	3.20	3.63	3.85	3.53	3.27	2.69	2.90	2.47	2.06	1.67	1.46	.33	.40	.42	.40	.12	-.61	-1.91	-3.27	3.00	3.01				
1987	5.10	4.87	4.64	4.37	4.31	4.12	4.03	3.80	3.65	3.56	3.29	3.00	3.32	3.52	3.19	2.93	2.36	2.61	2.11	1.71	1.33	1.11	.05	.16	.07	.08	-.29	.96	-2.06	-3.13	3.49	1.75	-2.69			
1988	4.99	4.70	4.54	4.20	4.22	4.04	3.94	3.72	3.57	3.48	3.22	2.94	3.24	3.43	3.12	2.86	2.32	2.55	2.08	1.71	1.35	1.15	.10	.29	.22	.25	-.05	-.59	-1.46	-2.17	-2.23	1.65	-.55	1.64		
1989	4.99	4.77	4.55	4.29	4.23	4.06	3.96	3.76	3.61	3.53	3.20	3.01	3.30	3.40	3.19	2.95	2.45	2.67	2.23	1.09	1.57	1.40	.52	.65	.62	.69	.97	.05	-.60	-1.00	-.09	.10	1.16	3.15	4.60	
1990	4.93	4.73	4.51	4.26	4.20	4.03	3.94	3.74	3.60	3.52	3.20	3.02	3.30	3.47	3.19	2.96	2.40	2.70	2.29	1.94	1.67	1.52	.71	.84	.83	.91	.73	.39	-.14	-.40	-.22	.54	1.66	3.16	3.93	3.10

Table 4.4 COMPOUND RATES OF CHANGE IN PRIVATE INSURANCE EXPENDITURES FOR HOSPITAL SERVICES

PIPLZ

YEARS

YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1955	0.23																																			
1956	3.43	16.71																																		
1957	10.10	10.04	3.74																																	
1958	9.24	8.91	5.21	6.70																																
1959	9.11	8.83	6.32	7.63	8.50																															
1960	8.25	7.86	5.74	6.44	6.31	4.00																														
1961	8.07	7.72	6.00	6.50	6.54	5.53	7.01																													
1962	7.87	6.63	5.03	5.29	4.95	3.76	3.40	.31																												
1963	7.26	6.89	5.56	5.07	5.70	4.99	5.30	4.46	8.77																											
1964	7.13	6.79	5.61	5.00	5.74	5.10	5.46	4.94	7.34	5.93																										
1965	6.74	6.40	5.31	5.51	5.34	4.81	4.96	4.46	5.00	4.46	3.01																									
1966	5.79	5.40	4.33	4.39	4.11	3.49	3.39	2.60	3.20	1.51	-.63	-4.14																								
1967	4.11	3.61	2.50	2.37	1.90	1.10	.60	-.34	-.46	-2.65	-5.35	-9.27	-14.13																							
1968	4.23	3.70	2.77	2.60	2.20	1.61	1.30	.51	.55	-1.82	-2.69	-4.51	-4.70	5.76																						
1969	4.05	3.62	2.68	2.59	2.23	1.61	1.34	.65	.70	-.50	-1.04	-3.01	-2.63	3.60	1.64																					
1970	4.13	3.74	2.87	2.80	2.40	1.94	1.73	1.16	1.27	.24	-.67	-1.39	-.70	4.23	3.40	5.35																				
1971	3.85	3.47	2.64	2.56	2.25	1.74	1.53	1.00	1.07	.15	-.65	-1.25	-.66	3.03	2.13	2.30	-.51																			
1972	3.63	3.25	2.46	2.30	2.00	1.59	1.39	.09	.95	.12	-.59	-1.09	-.57	2.39	1.56	1.53	-.32	-.13																		
1973	3.71	3.30	2.64	2.50	2.31	1.87	1.71	1.20	1.36	.65	.00	-.20	.29	2.91	2.35	2.51	1.61	2.69	5.59																	
1974	3.60	3.35	2.65	2.59	2.34	1.93	1.70	1.39	1.40	.04	.35	.06	.59	2.09	2.42	2.50	1.90	2.72	4.17	2.77																
1975	3.82	3.51	2.86	2.81	2.59	2.22	2.10	1.76	1.87	1.32	.91	.78	1.25	3.36	3.02	3.25	2.04	3.70	5.00	4.71	6.69															
1976	3.77	3.47	2.85	2.80	2.59	2.24	2.13	1.81	1.92	1.41	1.05	.87	1.30	3.27	2.97	3.16	2.00	3.47	4.39	4.00	4.61	2.57														
1977	3.51	3.21	2.61	2.55	2.34	2.00	1.80	1.57	1.65	1.16	.81	.62	1.07	2.73	2.40	2.49	2.09	2.53	3.07	2.45	2.35	.24	-2.04													
1978	3.45	3.16	2.59	2.53	2.33	2.01	1.90	1.60	1.60	1.23	.90	.74	1.16	2.60	2.37	2.46	2.10	2.40	2.92	2.40	2.30	.00	.04	2.16												
1979	3.30	3.02	2.47	2.41	2.21	1.90	1.79	1.50	1.57	1.14	.83	.60	1.06	2.54	2.14	2.19	1.84	2.14	2.47	1.96	1.80	.61	-.03	.90	-.10											
1980	3.12	2.84	2.30	2.24	2.04	1.74	1.63	1.35	1.41	.99	.69	.54	.80	2.14	1.84	1.86	1.52	1.75	1.99	1.40	1.27	.22	-.34	.20	-.76	-1.34										
1981	3.00	2.81	2.29	2.23	2.04	1.76	1.65	1.39	1.44	1.05	.77	.63	.96	2.13	1.86	1.80	1.57	1.70	1.99	1.55	1.30	.52	.11	.44	.14	.33	2.03									
1982	2.93	2.67	2.17	2.10	1.92	1.64	1.53	1.27	1.32	.94	.60	.54	.84	1.93	1.66	1.66	1.36	1.53	1.70	1.27	1.09	.31	-.06	.34	-.11	-.09	.54	-.93								
1983	2.84	2.50	2.09	2.03	1.85	1.58	1.47	1.23	1.27	.91	.65	.52	.80	1.82	1.56	1.55	1.27	1.42	1.56	1.17	.99	.30	-.02	.32	-.05	-.01	.43	-.36	.22							
1984	2.81	2.56	2.09	2.03	1.85	1.59	1.49	1.25	1.30	.95	.71	.59	.86	1.82	1.50	1.50	1.31	1.45	1.59	1.23	1.00	.47	.21	.54	.27	.34	.79	.30	1.04	1.04						
1985	2.84	2.60	2.14	2.09	1.92	1.67	1.50	1.36	1.40	1.00	.85	.75	1.01	1.93	1.70	1.71	1.47	1.61	1.75	1.44	1.32	.79	.60	.93	.76	.91	1.37	1.21	1.93	2.00	3.74					
1986	2.88	2.65	2.21	2.16	2.00	1.76	1.60	1.47	1.52	1.21	1.00	.91	1.17	2.05	1.84	1.86	1.60	1.79	1.92	1.65	1.56	1.10	.95	1.29	1.10	1.30	1.04	1.00	2.50	3.27	3.90	4.23				
1987	2.86	2.64	2.21	2.16	2.01	1.78	1.70	1.50	1.55	1.25	1.06	.97	1.22	2.05	1.86	1.80	1.67	1.81	1.94	1.69	1.61	1.19	1.07	1.30	1.30	1.40	1.09	1.07	2.44	3.01	3.39	3.22	2.21			
1988	2.82	2.60	2.19	2.14	1.99	1.77	1.69	1.50	1.54	1.27	1.08	.99	1.23	2.03	1.85	1.86	1.67	1.80	1.92	1.60	1.60	1.22	1.11	1.40	1.32	1.49	1.05	1.02	2.29	2.71	2.92	2.65	1.07	1.52		
1989	2.66	2.44	2.04	1.99	1.84	1.62	1.54	1.35	1.30	1.11	.92	.84	1.06	1.81	1.62	1.62	1.43	1.54	1.69	1.40	1.31	.93	.81	1.05	.95	1.06	1.13	1.25	1.54	1.79	1.77	1.29	.12	.61	2.70	
1990	2.53	2.32	1.92	1.87	1.72	1.51	1.42	1.24	1.27	1.08	.82	.73	.94	1.65	1.47	1.46	1.27	1.36	1.45	1.21	1.11	.75	.62	.83	.72	.00	1.01	.90	1.13	1.26	1.16	.66	.22	1.01	2.26	1.82

4.2.3 Governmental Expenditures

Financial access can also be measured by the government's activities in health. As we mentioned, access is often discussed in terms of how well the private health sector is meeting national needs. New work on access also has been extended to consider public services. These extensions are usually focused on specific population groups such as Native Americans or specific demographic areas such as shortage areas as we will discuss in the next section on functional access issues. Here we are concerned about financial access.

An often cited statistic is that physician visits per year for the poor went from 3.8 to 6.2 from 1964 to 1978, whereas for the nonpoor they went from 4.7 to 5.0 in the same period.[4] More recent 1980 Health Interview survey data confirm their findings. Individuals with less than $7,000 incomes had 5.5 physician visits, those with incomes over $15,000 had 4.7 visits per year. The opinion is that government programs are so extensive that the poor have better access than the nonpoor. It should be noted that one determinant of poverty is health. Thus one needs to be especially careful to separate cause and effect when considering access, especially if policy is to be based upon it. As in the case of the working uninsured, where the tax benefits of tax free income are low (because the individuals are in low income occupations and bear a lower marginal tax burden), we find lower insurance coverage. These results are all derived indirectly from our model. The impact of the growing numbers of physicians is part of the explanation of access. However, other factors are also at work. This interdependence, simultaneity or symbiosis is the foundation of our approach to these issues.

---

[4] David Rogers, "Who Needs Medicaid?" New England Journal of Medicine, July 1, 1982.

Access to health, as measured by governmental expenditures, is projected to increase through the 1980's. The increase is on an inflation adjusted basis and represents a real expansion of these public programs. Hospital expenditures are projected to increase along their historic trend. Physician expenditures are projected to grow at a reduced rate. This reduction is principally due to the impact of competition on the physician sector. From Table 4.5 we can see that the compound rate of growth for inflation adjusted government expenditures or physician services is predicted to slow to 2.32 percent per year from the 6.56 percent rate that existed from 1970 to 1980. From Table 4.6 we see that the compound growth rates of real government expenditures on hospital services will also slow from 2.48 percent per year in the 1970 to 1980 era to 1.82 percent in the 1980 to 1990 period. The slowing of these rates of increase still means considerable expansion of the programs in real terms indicating increased access. While it is also clear that governmental physician service expenditures have slowed the most, their growth rate continues to exceed that of hospital expenditures.

Table 4.5 COMPOUND RATES OF CHANGE OF GOVERNMENT EXPENDITURES ON PHYSICIAN SERVICES

GOVT EXPENDITURES ON PHYSICIAN SERVICES

GOVT EXPENDITURES ON PHYSICIAN SERVICES
YEARS

YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1955	4.42																																			
1956	5.69	6.98																																		
1957	6.73	7.90	8.84																																	
1958	7.29	8.26	8.91	8.98																																
1959	6.52	7.85	7.67	6.20	3.50																															
1960	4.53	4.55	3.96	2.38	-.77	-4.84																														
1961	5.16	5.29	4.96	4.01	2.40	1.84	9.04																													
1962	5.41	5.55	5.31	4.62	3.56	3.58	8.07	7.11																												
1963	5.22	5.32	5.09	4.47	3.60	3.62	6.61	5.42	3.73																											
1964	5.12	5.20	4.90	4.44	3.70	3.74	6.01	5.02	3.99	4.23																										
1965	5.23	5.31	5.12	4.67	4.07	4.16	6.07	5.33	4.75	5.25	6.29																									
1966	8.00	8.33	8.47	8.43	8.36	9.08	11.59	12.11	13.39	16.80	23.64	43.83																								
1967	14.39	15.26	16.05	16.79	17.70	19.60	23.58	26.18	30.38	38.05	51.60	81.06	127.93																							
1968	14.35	15.15	15.86	16.52	17.30	18.94	22.31	24.33	27.46	32.82	41.12	55.10	61.06	13.81																						
1969	13.61	14.30	14.88	15.40	16.00	17.33	20.10	21.56	23.78	27.47	32.71	40.28	39.12	8.68	3.79																					
1970	12.73	13.30	13.77	14.16	14.60	15.67	17.95	18.98	20.56	23.17	26.65	31.17	28.18	5.80	2.01	.25																				
1971	12.10	12.60	12.90	13.20	13.62	14.51	16.45	17.22	18.40	20.37	22.88	25.88	22.57	4.96	2.17	1.37	2.49																			
1972	12.11	12.50	12.94	13.22	13.53	14.34	16.11	16.77	17.70	19.45	21.51	23.85	20.80	6.40	4.63	4.90	7.31	12.35																		
1973	11.82	12.24	12.56	12.80	13.05	13.77	15.35	15.89	16.72	18.10	19.75	21.55	18.67	6.43	5.02	5.33	7.07	9.44	6.61																	
1974	11.61	12.00	12.29	12.50	12.72	13.36	14.79	15.25	15.95	17.13	18.51	19.95	17.25	6.63	5.40	5.82	7.26	8.90	7.22	7.83																
1975	11.40	11.84	12.11	12.29	12.49	13.00	14.39	14.70	15.39	16.42	17.59	18.79	16.29	6.91	5.96	6.32	7.58	8.89	7.76	8.34	8.85															
1976	11.27	11.61	11.84	12.00	12.17	12.71	13.90	14.24	14.76	15.66	16.66	17.66	15.32	6.91	6.00	6.41	7.47	8.49	7.95	7.87	7.88	6.93														
1977	10.79	11.08	11.20	11.41	11.54	12.00	13.00	13.34	13.77	14.52	15.35	16.14	13.90	6.27	5.46	5.67	6.47	7.15	6.14	6.02	5.42	3.75	.67													
1978	10.60	10.88	11.06	11.17	11.28	11.71	12.71	12.93	13.30	13.97	14.70	15.37	13.27	6.29	5.57	5.77	6.48	7.06	6.20	6.12	5.70	4.67	3.54	6.50												
1979	10.49	10.75	10.92	11.01	11.11	11.51	12.44	12.63	12.97	13.57	14.22	14.81	12.84	6.42	5.77	5.97	6.62	7.15	6.43	6.40	6.11	5.44	4.95	7.16	7.77											
1980	10.31	10.56	10.71	10.79	10.87	11.24	12.11	12.27	12.57	13.11	13.69	14.20	12.33	6.30	5.79	5.97	6.56	7.02	6.37	6.34	6.09	5.55	5.21	6.77	6.88	6.00										
1981	10.22	10.45	10.59	10.66	10.73	11.07	11.90	12.04	12.31	12.80	13.33	13.70	12.02	6.40	5.93	6.11	6.64	7.09	6.52	6.51	6.32	5.91	5.71	7.00	7.16	6.85	7.71									
1982	9.66	9.84	9.95	9.99	10.04	10.33	11.07	11.17	11.30	11.80	12.23	12.59	10.80	5.60	5.12	5.23	5.65	5.94	5.32	5.10	4.85	4.30	3.86	4.52	4.01	2.79	1.23	-4.87								
1983	9.42	9.61	9.71	9.74	9.77	10.04	10.70	10.82	11.00	11.37	11.76	12.07	10.44	5.55	5.02	5.11	5.49	5.75	5.17	5.02	4.72	4.21	3.83	4.36	3.93	3.00	2.01	-.72	3.61							
1984	9.17	9.34	9.42	9.44	9.46	9.71	10.36	10.42	10.57	10.91	11.25	11.52	9.96	5.34	4.83	4.90	5.24	5.46	4.90	4.75	4.44	3.97	3.60	4.03	3.61	2.80	2.02	.19	2.82	2.03						
1985	8.92	9.07	9.14	9.15	9.16	9.30	10.00	10.04	10.16	10.47	10.77	11.01	9.50	5.13	4.64	4.69	4.99	5.17	4.64	4.48	4.18	3.72	3.37	3.72	3.32	2.60	1.93	.53	2.40	1.80	1.57					
1986	8.68	8.82	8.88	8.88	8.88	9.08	9.65	9.60	9.79	10.06	10.33	10.53	9.08	4.93	4.46	4.50	4.77	4.92	4.41	4.24	3.95	3.52	3.18	3.46	3.09	2.43	1.85	.72	2.17	1.69	1.52	1.47				
1987	8.48	8.61	8.66	8.66	8.64	8.83	9.30	9.39	9.40	9.73	9.97	10.14	8.75	4.80	4.35	4.38	4.63	4.76	4.28	4.11	3.83	3.42	3.11	3.36	3.01	2.43	1.93	1.00	2.21	1.86	1.81	1.93	2.39			
1988	8.29	8.41	8.46	8.44	8.43	8.60	9.11	9.12	9.20	9.42	9.64	9.79	8.45	4.68	4.24	4.27	4.50	4.61	4.15	3.99	3.72	3.33	3.04	3.26	2.93	2.41	1.97	1.18	2.22	1.95	1.92	2.04	2.33	2.27		
1989	8.17	8.29	8.33	8.31	8.29	8.45	8.94	8.94	9.01	9.22	9.42	9.55	8.26	4.66	4.24	4.27	4.48	4.59	4.16	4.00	3.75	3.40	3.13	3.34	3.05	2.59	2.22	1.56	2.51	2.33	2.39	2.59	2.97	3.26	4.26	
1990	8.03	8.14	8.17	8.15	8.12	8.20	8.75	8.74	8.79	8.90	9.17	9.29	8.05	4.60	4.19	4.21	4.42	4.52	4.10	3.95	3.71	3.38	3.13	3.33	3.06	2.64	2.32	1.73	2.59	2.44	2.51	2.70	3.01	3.22	3.70	3.15

BEST COPY AVAILABLE

Table 4.6 COMPOUND RATES OF CHANGE OF GOVERNMENT EXPENDITURES ON HOSPITAL SERVICES

GOVT EXPENDITURES ON HOSPITAL SERVICES

YEARS

YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
1955	1.45																	
1956	2.68	3.93																
1957	1.09	2.11	.32															
1958	1.65	1.72	.63	.94														
1959	1.25	1.20	.31	.30	-.34													
1960	.50	.31	-.50	-.08	-1.77	-3.19												
1961	.55	.40	-.29	-.44	-.90	-1.17	.00											
1962	.43	.20	.31	.44	-.70	-.92	.23	-.42										
1963	.36	.22	-.30	-.40	-.66	-.75	.00	-.32	-.21									
1964	.42	.31	-.14	-.20	-.39	-.40	.31	.12	.30	.90								
1965	.30	.27	-.13	-.10	-.34	-.34	.24	.00	.24	.47	-.04							
1966	1.99	2.04	1.85	2.02	2.16	2.52	3.58	4.03	5.10	7.04	10.20	21.49						
1967	3.36	3.52	3.40	3.00	4.12	4.69	5.87	6.73	8.22	10.43	13.77	21.30	21.27					
1968	3.22	3.36	3.31	3.59	3.84	4.33	5.32	5.96	7.07	8.59	10.57	14.34	10.95	1.51				
1969	3.10	3.21	3.16	3.40	3.63	4.03	4.87	5.37	6.23	7.34	8.66	10.95	7.65	1.42	1.34			
1970	2.85	2.94	2.87	3.07	3.25	3.58	4.20	4.67	5.32	6.14	7.02	8.49	5.47	.67	.26	-.02		
1971	2.60	2.67	2.59	2.75	2.90	3.17	3.77	4.06	4.57	5.19	5.80	6.01	4.09	.19	-.25	-1.03	-1.25	
1972	2.71	2.79	2.72	2.80	3.02	3.20	3.84	4.11	4.50	5.12	5.65	6.49	4.18	1.06	.95	.02	1.65	4.63
1973	2.84	2.92	2.86	3.02	3.16	3.42	3.95	4.21	4.64	5.13	5.61	6.33	4.33	1.74	1.79	1.91	2.83	4.93
1974	3.07	3.16	3.11	3.20	3.43	3.60	4.19	4.45	4.87	5.34	5.79	6.46	4.71	2.54	2.71	2.99	3.96	5.76
1975	3.06	3.15	3.10	3.26	3.40	3.64	4.11	4.34	4.72	5.14	5.53	6.10	4.52	2.59	2.75	2.99	3.76	5.05
1976	2.90	2.97	2.93	3.07	3.19	3.40	3.82	4.02	4.35	4.71	5.02	5.49	4.02	2.26	2.35	2.50	3.06	3.94
1977	2.83	2.90	2.85	2.90	3.00	3.20	3.67	3.85	4.14	4.46	4.73	5.14	3.74	2.16	2.23	2.34	2.80	3.49
1978	2.74	2.80	2.75	2.86	2.96	3.14	3.50	3.66	3.92	4.20	4.43	4.70	3.50	2.02	2.07	2.15	2.53	3.00
1979	2.67	2.72	2.67	2.78	2.84	3.03	3.37	3.51	3.74	3.99	4.20	4.51	3.30	1.93	1.97	2.03	2.35	2.81
1980	2.71	2.76	2.71	2.81	2.90	3.06	3.38	3.51	3.74	3.97	4.16	4.45	3.33	2.06	2.11	2.18	2.40	2.91
1981	2.71	2.76	2.71	2.81	2.89	3.04	3.35	3.47	3.60	3.90	4.00	4.34	3.29	2.11	2.16	2.22	2.50	2.89
1982	2.70	2.75	2.70	2.80	2.88	3.02	3.31	3.43	3.62	3.83	3.99	4.23	3.24	2.13	2.18	2.24	2.50	2.85
1983	2.67	2.72	2.67	2.77	2.84	2.97	3.25	3.36	3.54	3.73	3.88	4.10	3.14	2.12	2.17	2.23	2.46	2.70
1984	2.64	2.68	2.63	2.72	2.79	2.92	3.18	3.28	3.45	3.63	3.76	3.97	3.07	2.09	2.13	2.18	2.40	2.60
1985	2.61	2.65	2.60	2.69	2.75	2.87	3.12	3.22	3.38	3.54	3.67	3.86	3.00	2.07	2.11	2.15	2.36	2.67
1986	2.58	2.61	2.57	2.65	2.71	2.83	3.06	3.15	3.30	3.46	3.57	3.75	2.93	2.05	2.08	2.12	2.31	2.55
1987	2.55	2.58	2.54	2.61	2.67	2.78	3.01	3.09	3.23	3.38	3.48	3.65	2.87	2.02	2.05	2.09	2.26	2.49
1988	2.52	2.55	2.51	2.58	2.63	2.74	2.96	3.03	3.17	3.31	3.40	3.56	2.81	2.00	2.03	2.06	2.23	2.43
1989	2.49	2.52	2.48	2.55	2.60	2.70	2.91	2.98	3.11	3.24	3.33	3.47	2.75	1.98	2.00	2.04	2.19	2.38
1990	2.46	2.49	2.45	2.51	2.56	2.66	2.86	2.93	3.05	3.17	3.26	3.39	2.70	1.96	1.98	2.01	2.15	2.34

YEARS

YEARS	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1973	5.23																	
1974	6.33	7.44																
1975	5.20	5.10	2.96															
1976	3.77	3.29	1.27	-.39														
1977	3.27	2.70	1.27	.44	1.27													
1978	2.82	2.35	1.11	.51	.95	.64												
1979	2.56	2.12	1.09	.62	.96	.80	.97											
1980	2.69	2.34	1.51	1.22	1.63	1.75	2.30	3.65										
1981	2.70	2.30	1.60	1.47	1.84	1.99	2.44	3.18	2.71									
1982	2.60	2.40	1.70	1.61	1.95	2.09	2.45	2.95	2.60	2.49								
1983	2.61	2.35	1.80	1.66	1.95	2.07	2.36	2.71	2.39	2.23	1.97							
1984	2.52	2.30	1.78	1.65	1.90	1.99	2.22	2.47	2.18	2.08	1.76	1.54						
1985	2.47	2.24	1.78	1.66	1.89	1.97	2.16	2.36	2.10	1.95	1.77	1.66	1.70					
1986	2.40	2.19	1.76	1.65	1.86	1.93	2.09	2.25	2.02	1.88	1.73	1.64	1.69	1.61				
1987	2.35	2.14	1.75	1.64	1.83	1.89	2.03	2.16	1.95	1.82	1.69	1.62	1.64	1.57	1.53			
1988	2.30	2.11	1.74	1.64	1.81	1.86	1.99	2.10	1.91	1.79	1.67	1.61	1.63	1.58	1.57	1.61		
1989	2.25	2.07	1.72	1.63	1.79	1.83	1.94	2.04	1.86	1.76	1.65	1.60	1.61	1.57	1.55	1.57	1.52	
1990	2.21	2.03	1.71	1.62	1.77	1.81	1.90	1.99	1.82	1.72	1.63	1.58	1.59	1.55	1.53	1.53	1.49	1.46

BEST COPY AVAILABLE

4.2.4 Total Third Party Expenditures

Third party expenditures are the arithmetic sum of private insurance expenditures and government expenditures. In the sense that they indicate continuing access to health care through our current system, they are relevant to our study. We found that the impact of the increased number of physicians was to increase access in both the hospital and physician sectors. Expenditures for physician services by all third parties increased at an annual rate of 5.19 percent from 1970 to 1980 and that was a reduction from the 1960 to 1970 rate of 9.84 percent that included the Medicare-Medicaid buildup. The forecast is for the rate to fall to 1.44 percent in the 1980 to 1990 period. See Table 4.7.

Third party hospital services exhibited the same decreasing but positive growth beginning with 3.17 from 1960 to 1970, 2.1 percent in 1970 to 1980 and forecast to be 1.52 from 1980 to 1990. See Table 4.8.

Table 4.7 COMPOUND RATES OF CHANGE OF TOTAL THIRD PARTY EXPENDITURES FOR PHYSICIAN SERVICES

YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1955	10.50																																			
1956	10.91	11.23																																		
1957	11.31	11.67	12.11																																	
1958	10.16	10.02	9.43	6.80																																
1959	9.79	9.59	9.05	7.54	8.29																															
1960	8.87	8.54	7.87	6.49	6.34	4.43																														
1961	9.00	8.74	8.25	7.31	7.47	7.87	9.70																													
1962	8.83	8.59	8.15	7.18	7.52	7.26	8.71	7.66																												
1963	8.84	8.10	7.75	7.04	7.00	6.70	7.50	6.50	5.35																											
1964	8.49	8.26	7.89	7.30	7.39	7.21	7.91	7.30	7.12	8.91																										
1965	8.57	8.37	8.05	7.55	7.66	7.54	8.20	7.00	7.05	9.13	9.34																									
1966	8.22	8.01	7.49	7.21	7.27	7.12	7.50	7.14	7.01	7.57	6.91	4.53																								
1967	9.71	9.63	9.49	9.23	9.50	9.65	10.42	10.53	11.12	12.60	13.06	16.19	29.16																							
1968	9.83	9.77	9.65	9.43	9.70	9.05	10.55	10.66	11.17	12.37	13.75	14.59	19.90	11.45																						
1969	9.59	9.52	9.39	9.17	9.30	9.49	10.07	10.11	10.46	11.34	11.03	12.46	15.24	8.05	6.30																					
1970	9.40	9.40	9.28	9.06	9.25	9.34	9.04	9.05	10.13	10.03	11.15	11.51	13.33	8.50	7.05	7.81																				
1971	8.98	8.79	8.63	8.39	8.51	8.53	8.91	8.82	8.95	9.41	9.40	9.51	10.53	6.31	4.65	3.83	.00																			
1972	9.02	8.93	8.79	8.57	8.70	8.73	9.09	9.03	9.17	9.60	9.69	9.74	10.64	7.26	6.24	6.22	5.43	11.14																		
1973	8.94	8.84	8.71	8.50	8.61	8.63	8.96	8.90	9.01	9.30	9.43	9.45	10.17	7.29	6.47	6.51	6.09	9.27	7.40																	
1974	8.85	8.76	8.42	8.42	8.52	8.54	8.84	8.77	8.86	9.10	9.21	9.20	9.00	7.20	6.60	6.44	6.37	8.50	7.31	7.23																
1975	8.71	8.61	8.40	8.20	8.36	8.37	8.64	8.56	8.63	8.90	8.90	8.86	9.35	7.10	6.49	6.52	6.27	7.90	6.83	6.54	5.06															
1976	8.80	8.72	8.59	8.41	8.50	8.52	8.70	8.71	8.79	9.05	9.07	9.04	9.50	7.51	7.03	7.13	7.02	8.40	7.03	7.97	8.34	10.07														
1977	8.39	8.29	8.15	7.96	8.02	8.00	8.22	8.12	8.15	8.35	8.31	8.22	8.57	6.70	6.10	6.17	5.93	6.96	6.14	5.82	5.36	5.10	-.36													
1978	8.16	8.06	7.92	7.72	7.77	7.74	7.93	7.82	7.83	8.00	7.93	7.83	8.11	6.37	5.00	5.83	5.50	6.41	5.64	5.29	4.81	4.46	1.39	3.17												
1979	7.96	7.85	7.71	7.51	7.54	7.51	7.67	7.56	7.55	7.69	7.61	7.49	7.72	6.10	5.62	5.56	5.31	5.99	5.28	4.93	4.47	4.12	1.97	3.15	3.14											
1980	7.81	7.70	7.55	7.36	7.30	7.34	7.49	7.37	7.35	7.47	7.30	7.25	7.45	5.94	5.50	5.42	5.19	5.78	5.13	4.80	4.41	4.12	2.49	3.46	3.61	4.09										
1981	7.72	7.61	7.47	7.20	7.30	7.26	7.39	7.20	7.26	7.36	7.27	7.15	7.32	5.91	5.50	5.43	5.22	5.75	5.17	4.89	4.56	4.35	3.09	3.97	4.24	4.00	5.52									
1982	7.46	7.34	7.19	7.00	7.01	6.96	7.07	6.94	6.91	6.99	6.89	6.74	6.80	5.54	5.13	5.04	4.82	5.27	4.69	4.40	4.05	3.79	2.66	3.27	3.30	3.35	2.90	.51								
1983	7.29	7.18	7.03	6.84	6.84	6.70	6.80	6.75	6.71	6.70	6.67	6.52	6.64	5.37	4.90	4.89	4.66	5.06	4.52	4.24	3.91	3.47	2.60	3.20	3.21	3.22	2.94	1.67	2.04							
1984	7.03	6.91	6.76	6.57	6.56	6.49	6.57	6.44	6.38	6.43	6.31	6.15	6.24	5.03	4.64	4.53	4.30	4.64	4.11	3.82	3.40	3.22	2.30	2.69	2.61	2.50	2.11	1.00	1.25	-.32						
1985	6.74	6.62	6.46	6.26	6.24	6.16	6.23	6.09	6.02	6.05	5.92	5.75	5.82	4.65	4.24	4.14	3.90	4.10	3.46	3.36	3.01	2.73	1.86	2.14	2.00	1.81	1.36	.35	.29	-.96	-1.50					
1986	6.47	6.34	6.19	5.99	5.96	5.87	5.93	5.70	5.70	5.71	5.57	5.39	5.44	4.32	3.94	3.80	3.55	3.79	3.29	2.90	2.63	2.34	1.53	1.74	1.56	1.34	.80	-.02	-.15	-1.13	-1.53	-1.47				
1987	6.26	6.13	5.97	5.77	5.73	5.64	5.69	5.53	5.45	5.45	5.31	5.13	5.15	4.00	3.70	3.56	3.32	3.53	3.04	2.73	2.40	2.11	1.35	1.52	1.34	1.12	.70	-.08	-.19	-.94	-1.14	-.92	-.37			
1988	6.13	6.00	5.84	5.64	5.60	5.51	5.55	5.40	5.31	5.31	5.16	4.90	5.01	3.90	3.62	3.40	3.24	3.43	2.97	2.60	2.36	2.10	1.40	1.56	1.40	1.21	.06	.21	.16	-.37	-.30	.02	.77	1.93		
1989	6.08	5.95	5.80	5.61	5.57	5.40	5.51	5.37	5.20	5.20	5.14	4.96	4.90	4.00	3.64	3.53	3.11	3.49	3.06	2.79	2.50	2.77	1.63	1.80	1.60	1.53	1.25	.73	.76	.42	.57	1.12	2.00	3.20	4.40	
1990	6.00	5.87	5.72	5.53	5.49	5.40	5.44	5.29	5.20	5.20	5.06	4.89	4.71	3.96	3.63	3.51	3.30	3.47	3.06	2.81	2.54	2.33	1.74	1.71	1.08	1.60	1.44	1.00	1.06	.01	1.00	1.52	2.29	3.19	3.02	3.17

BEST COPY AVAILABLE

Table 4.8 COMPOUND RATES OF CHANGE OF TOTAL THIRD PARTY EXPENDITURES FOR HOSPITAL SERVICES

TPHL/
YEARS

YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1955	4.59																																			
1956	6.65	8.75																																		
1957	4.98	5.17	1.71																																	
1958	4.56	4.55	2.51	3.32																																
1959	4.34	4.20	2.83	3.39	3.47																															
1960	3.62	3.42	2.11	2.27	1.75	.87																														
1961	3.63	3.47	2.45	2.64	2.41	1.80	3.74																													
1962	3.16	2.96	2.03	2.09	1.70	1.23	1.02	-.87																												
1963	3.27	3.10	2.32	2.42	2.25	1.94	2.58	2.00	4.12																											
1964	3.29	3.15	2.47	2.57	2.45	2.25	2.80	2.49	3.00	3.40																										
1965	3.13	2.98	2.36	2.44	2.32	2.13	2.55	2.25	3.94	2.50	1.53																									
1966	3.53	3.44	2.92	3.05	3.02	2.96	3.45	3.39	4.27	4.33	4.75	8.08																								
1967	3.63	3.55	3.09	3.23	3.22	3.19	3.65	3.63	4.39	4.46	4.70	6.45	4.04																							
1968	3.60	3.52	3.10	3.22	3.21	3.10	3.50	3.56	4.10	4.19	4.37	5.33	3.98	3.12																						
1969	3.45	3.37	2.97	3.07	3.05	3.01	3.34	3.29	3.70	3.73	3.70	4.35	3.13	2.29	1.46																					
1970	3.33	3.25	2.87	2.96	2.93	2.80	3.17	3.10	3.51	3.42	3.41	3.79	2.74	2.05	1.52	1.59																				
1971	3.00	2.98	2.61	2.67	2.63	2.56	2.79	2.69	3.00	2.84	2.70	2.98	1.99	1.29	.69	.31	-.95																			
1972	3.06	2.97	2.62	2.60	2.63	2.57	2.70	2.69	2.97	2.84	2.77	2.94	2.11	1.57	1.19	1.10	.85	2.69																		
1973	3.10	3.10	2.78	2.84	2.81	2.76	2.97	2.91	3.19	3.09	3.05	3.24	2.57	2.20	2.01	2.15	2.34	4.02	5.37																	
1974	3.30	3.23	2.93	3.00	2.90	2.95	3.16	3.12	3.39	3.32	3.30	3.50	2.94	-2.67	2.60	2.83	3.14	4.54	5.40	5.59																
1975	3.35	3.29	3.01	3.00	3.07	3.04	3.24	3.21	3.46	3.41	3.40	3.59	3.10	2.09	2.86	3.09	3.39	4.51	5.12	5.00	4.40															
1976	3.23	3.17	2.89	2.96	2.94	2.91	3.09	3.04	3.27	3.20	3.10	3.33	2.87	2.65	2.59	2.76	2.95	3.75	4.02	3.57	2.58	.78														
1977	3.09	3.02	2.75	2.80	2.70	2.74	2.90	2.85	3.04	2.97	2.93	3.05	2.60	2.30	2.30	2.40	2.52	3.11	3.19	2.65	1.69	.36	-.04													
1978	3.01	2.94	2.68	2.73	2.70	2.66	2.81	2.75	2.93	2.85	2.81	2.91	2.49	2.27	2.19	2.27	2.36	2.84	2.86	2.37	1.50	.65	.59	1.24												
1979	2.91	2.84	2.59	2.63	2.59	2.55	2.68	2.63	2.79	2.70	2.65	2.73	2.33	2.13	2.04	2.09	2.15	2.54	2.52	2.06	1.36	.62	.54	.87	.51											
1980	2.86	2.79	2.55	2.59	2.55	2.51	2.63	2.58	2.72	2.64	2.59	2.66	2.29	2.09	2.01	2.06	2.10	2.45	2.42	2.00	1.42	.83	.84	1.14	1.10	1.69										
1981	2.84	2.78	2.55	2.58	2.55	2.51	2.62	2.57	2.71	2.63	2.58	2.65	2.30	2.12	2.04	2.09	2.14	2.45	2.42	2.06	1.56	1.10	1.16	1.47	1.55	2.07	2.45									
1982	2.78	2.72	2.49	2.52	2.49	2.45	2.56	2.50	2.63	2.56	2.51	2.56	2.23	2.06	1.98	2.02	2.06	2.33	2.30	1.96	1.52	1.11	1.17	1.41	1.46	1.70	1.82	1.19								
1983	2.73	2.67	2.45	2.48	2.44	2.40	2.51	2.45	2.57	2.49	2.44	2.49	2.17	2.01	1.94	1.97	2.00	2.25	2.21	1.90	1.50	1.14	1.19	1.40	1.43	1.66	1.65	1.25	1.32							
1984	2.70	2.63	2.42	2.45	2.41	2.37	2.47	2.42	2.53	2.45	2.40	2.45	2.15	1.99	1.92	1.95	1.98	2.20	2.16	1.88	1.51	1.20	1.25	1.44	1.47	1.66	1.65	1.39	1.49	1.66						
1985	2.69	2.63	2.42	2.45	2.42	2.38	2.47	2.42	2.53	2.46	2.41	2.45	2.16	2.02	1.95	1.98	2.01	2.23	2.19	1.93	1.60	1.33	1.39	1.57	1.62	1.80	1.82	1.67	1.83	2.08	2.50					
1986	2.69	2.63	2.43	2.45	2.42	2.39	2.48	2.43	2.53	2.46	2.42	2.46	2.19	2.05	1.99	2.02	2.05	2.25	2.22	1.98	1.60	1.44	1.51	1.60	1.74	1.91	1.95	1.85	2.02	2.25	2.55	2.59				
1987	2.66	2.60	2.41	2.43	2.40	2.36	2.45	2.40	2.50	2.43	2.39	2.43	2.17	2.03	1.98	2.01	2.03	2.22	2.19	1.97	1.69	1.47	1.53	1.69	1.74	1.90	1.93	1.88	1.97	2.14	2.29	2.19	1.79			
1988	2.63	2.57	2.38	2.40	2.37	2.34	2.42	2.37	2.47	2.40	2.36	2.39	2.14	2.01	1.96	1.98	2.01	2.18	2.15	1.94	1.60	1.40	1.54	1.60	1.73	1.86	1.90	1.90	1.91	2.02	2.11	1.98	1.60	1.38		
1989	2.55	2.49	2.31	2.33	2.29	2.26	2.33	2.28	2.37	2.30	2.26	2.29	2.04	1.92	1.86	1.88	1.89	2.06	2.02	1.81	1.56	1.36	1.41	1.53	1.56	1.67	1.66	1.56	1.62	1.67	1.67	1.46	1.09	.74	-.09	
1990	2.49	2.43	2.25	2.26	2.23	2.19	2.26	2.21	2.29	2.23	2.18	2.20	1.97	1.84	1.79	1.80	1.81	1.96	1.95	1.75	1.48	1.29	1.33	1.43	1.45	1.54	1.52	1.42	1.45	1.46	1.43	1.22	.80	.50	.00	.75

BEST COPY AVAILABLE

4.2.5 Direct or Out-Of-Pocket Expenditures

More reliance on direct or out-of-pocket expenditures is predicted by the model.[5] As competition increases, driven by the increases in physician manpower, increasing amounts will be spent on direct expenditures. One reason is that individuals will find that they can obtain services that better meet their needs outside the third party system. This may mean that actual price or service competition will begin for those without insurance.[6] It may be that insurance firms will not be able to react fast enough to acclimate to these changes and individuals will self-insure increasing proportions of health expenditures and opt for other tax exempt payments such as employer paid IRA's.

It may also be the case that these changing patterns are not purely voluntary. Increases in co-payments and deductibles would also be expected to prevail as expenditures grow. These changes could apply to both private insurance and government programs as well.

---

[5] Recall that these data are computed as a residual and contain some of the statistical errors from the insurance and government sectors. The interested reader is referred to the previous section on cost and the technical appendix for additional information.

[6] This is not unusual in other industries such as auto body work where there is one insurance price and a noninsurance price.

Because of the statistical variability in these data, one needs to be especially cognizant of the tentative nature of any inferences derived from them. By the same token, one should not be oblivious to competitive changes and other impacts on the industry derived from increases in physician manpower. One interesting consequence could be a greater number of semi-retired physicians who will supplement their income by treating individuals without insurance. We might also see policy initiatives based on the continued up trend in out-of-pocket hospital expenses without an understanding that market forces would tend to reverse these trends.

Table 4.9 clearly shows the wide swings in inflation adjusted direct expenses for hospital insurance. The 1960 to 1970 period was a -5.29 percent fall principally from the establishment of Medicare and Medicaid. A rise from 1970 to 1980 of 3.39 percent per year and reduction to 1.95 is predicted for 1980 to 1990. A brief scan of the table clearly indicates the variability of both the actual historical data and the computed forecast patterns. Table 4.10 shows a similar pattern but the variability is attenuated. From 1960 to 1970 the compound annual growth rate in real out-of-pocket physician expenditures averaged

0.88 percent per year. From 1970 to 1980 the rate grew to 2.55 and our forecast is for the rate to be reduced to 2.46 in the 1980 to 1990 period. The choice of these periods obscures the 1965 peak, the 1975 trough, and the rapid escalation from 1976 to 1981 where the growth rate was over seven percent. The full table is present so the interested reader can select in-sample or future periods that may be of interest.

Table 4.9 COMPOUND RATES OF CHANGE IN DIRECT EXPENDITURES FOR HOSPITAL SERVICES

OUT OF POCKET EXENDITURES ON HOSPITAL SERVICES

YEARS

YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1955	1.69																																			
1956	3.49	-16.81																																		
1957	9.34	-10.58	-3.07																																	
1958	5.24	-5.76	.31	4.60																																
1959	4.39	-4.57	-.10	1.04	-.91																															
1960	.63	.00	4.71	7.73	9.29	20.54																														
1961	-1.51	-1.15	2.33	3.94	3.69	6.07	-6.66																													
1962	-1.11	-.74	2.23	3.50	3.20	4.61	-2.55	1.75																												
1963	-.94	-.59	1.97	2.97	2.64	3.54	-1.57	1.00	.41																											
1964	-.57	-.22	2.00	2.94	2.67	3.40	-.49	1.66	1.62	2.04																										
1965	-.49	-.17	1.00	2.62	2.33	2.00	-.33	1.32	1.17	1.56	.29																									
1966	1.30	-1.00	.64	1.16	.73	.96	-1.90	-1.01	-1.69	-2.30	-4.09	-9.00																								
1967	-4.46	-4.52	-3.32	-3.26	-4.10	-4.50	-7.62	-7.70	-9.57	-11.91	-16.34	-23.59	-35.20																							
1968	-4.60	-4.76	-3.60	-3.66	-4.46	-4.05	-7.62	-7.75	-9.25	-11.07	-14.24	-18.60	-22.67	-7.61																						
1969	-4.03	-4.05	-2.99	-2.92	-3.50	-3.04	-6.23	-6.17	-7.25	-8.47	-10.50	-13.11	-14.10	-1.19	5.60																					
1970	-3.57	-3.56	-2.54	-2.43	-3.00	-3.19	-5.29	-5.14	-5.96	-6.04	-8.36	-10.00	-10.05	.30	4.62	3.50																				
1971	-4.00	-4.11	-3.19	-3.15	-3.72	-3.95	-5.92	-5.04	-6.65	-7.50	-8.09	-10.33	-10.44	-2.06	-1.22	-4.50	-11.95																			
1972	-2.70	-2.65	-1.60	-1.54	-1.97	-2.05	-3.72	-3.45	-3.96	-4.43	-5.30	-6.00	-5.44	2.01	4.56	4.19	4.50	24.03																		
1973	2.11	-2.02	-1.07	-.90	-1.26	-1.20	-2.79	-2.46	-2.03	-3.15	-3.79	-4.29	-3.47	3.10	5.40	5.43	6.05	16.39	9.23																	
1974	-2.50	-2.44	-1.57	-1.44	-1.01	-1.07	-3.30	-3.03	-3.42	-3.74	-4.40	-4.91	-4.20	1.23	2.70	2.21	1.07	6.95	-.69	-9.71																
1975	-3.20	-3.10	-2.40	-2.32	-2.72	-2.03	-4.21	-4.04	-4.47	-4.06	-5.53	-6.10	-5.60	-1.13	-.17	-1.11	-2.02	.63	-6.14	-13.00	-16.17															
1976	2.97	-2.94	-2.10	-2.09	-2.46	-2.55	-3.03	-3.64	-4.02	-4.35	-4.92	-5.30	-4.93	-.70	.11	-.66	-1.36	.91	-4.16	-8.25	-7.51	2.05														
1977	-2.02	-1.94	-1.17	-1.04	-1.33	-1.35	-2.51	-2.24	-2.50	-2.71	-3.12	-3.40	-2.00	1.24	2.27	1.05	1.61	4.07	.40	-1.60	1.26	11.29	21.34													
1978	-2.20	-2.14	-1.41	-1.29	-1.50	-1.62	-2.72	-2.40	-2.74	-2.95	-3.35	-3.62	-3.09	.53	1.39	.92	.59	2.53	-.60	-2.55	-.67	5.11	6.67	-6.24												
1979	-1.51	-1.42	-.60	-.54	-.70	-.77	-1.70	-1.51	-1.69	-1.02	-2.13	-2.30	-1.69	1.79	2.69	2.40	2.26	4.20	1.64	.42	2.50	7.09	9.91	4.59	16.60											
1980	-.95	-.04	-.11	.06	-.15	-.11	-1.04	-.74	-.80	-.95	-1.10	-1.20	-.64	2.69	3.60	3.41	3.39	5.26	3.12	2.27	4.42	9.11	10.95	7.60	15.40	14.12										
1981	-.06	-.75	-.04	.12	-.07	-.04	-.92	-.63	-.75	-.02	-1.03	-1.11	-.50	2.60	3.44	3.25	3.22	4.07	2.94	2.10	4.00	7.00	9.99	6.10	10.57	7.63	1.51									
1982	-.24	-.11	.60	.70	.62	.69	-.13	.19	.11	.10	-.05	-.07	.57	3.57	4.42	4.32	4.30	6.01	4.36	3.83	5.66	9.21	10.46	8.40	12.40	11.01	9.40	10.00								
1983	-.13	-.01	.60	.06	.71	.70	-.01	.31	.24	.23	.10	.09	.70	3.52	4.31	4.21	4.26	5.74	4.22	3.73	5.34	8.39	9.33	7.44	10.41	8.09	7.20	10.16	2.70							
1984	-.22	-.10	.55	.72	.57	.63	-.12	.17	.10	.09	-.05	-.07	.50	3.14	3.05	3.73	3.74	5.06	3.62	3.12	4.50	7.09	7.74	5.92	8.10	6.46	4.62	5.60	-.02	-2.75						
1985	-.42	-.31	.31	.46	.31	.36	-.37	-.10	-.10	-.21	-.35	-.30	.14	2.60	3.23	3.00	3.04	4.21	2.02	2.31	3.47	5.60	6.09	4.32	5.92	4.23	2.35	2.56	-2.14	-4.51	-6.24					
1986	-.60	-.50	.01	.15	-.01	.02	-.69	-.45	-.54	-.50	-.73	-.70	-.31	1.99	2.55	2.37	2.29	3.32	1.90	1.44	2.43	4.32	4.54	2.83	4.02	2.33	.40	.20	-3.70	-5.01	-7.31	-8.36				
1987	-.79	-.69	-.13	.00	-.16	-.13	-.02	-.59	-.60	-.73	-.80	-.93	-.49	1.67	2.19	2.00	1.90	2.04	1.56	1.04	1.91	3.59	3.73	2.11	3.00	1.50	-.19	-.46	-3.01	-5.39	-6.25	-6.26	-4.10			
1988	-.61	-.52	.04	.17	.02	.05	-.61	-.30	-.46	-.49	-.63	-.67	-.23	1.04	2.34	2.17	2.09	2.90	1.79	1.32	2.15	3.72	3.86	2.40	3.30	1.92	.49	.34	-2.35	-3.34	-3.49	-2.55	.49	5.31		
1989	-.39	-.29	.26	.39	.26	.30	-.34	-.10	-.17	-.19	-.31	-.34	.10	2.10	2.59	2.44	2.30	3.24	2.14	1.70	2.51	3.99	4.15	2.83	3.69	2.40	1.26	1.23	-.90	-1.59	-1.34	.09	2.02	6.47	7.60	
1990	-.15	-.05	.49	.63	.50	.55	-.06	.10	.12	.11	.01	.00	.43	2.37	2.04	2.71	2.67	3.50	2.47	2.00	2.07	4.20	4.44	3.24	4.07	3.00	1.95	1.99	.14	-.23	.20	1.54	4.10	7.09	8.00	8.15

BEST COPY AVAILABLE

Table 4.10 COMPOUND RATES OF CHANGE IN DIRECT EXPENDITURES FOR PHYSICIAN SERVICES

OUT OF POCKET EXPENDITURES ON PHYSICIAN SERVICES

YEARS

YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1955	4.26																																			
1956	.34	5.16																																		
1957	.42	2.85	.59																																	
1958	2.21	4.46	4.12	7.77																																
1959	3.33	5.32	5.30	7.85	7.95																															
1960	2.67	4.12	3.06	4.97	3.60	-.50																														
1961	1.70	2.02	2.36	2.01	1.21	-2.00	-3.39																													
1962	2.19	3.30	3.09	3.60	2.50	.05	1.57	6.79																												
1963	2.44	3.31	3.05	3.46	2.62	1.33	1.97	4.77	2.79																											
1964	3.04	4.70	4.74	5.34	4.94	4.35	5.62	8.01	9.04	17.30																										
1965	3.67	4.49	4.42	4.91	4.51	3.95	4.07	7.05	7.14	9.30	1.93																									
1966	2.97	3.65	3.50	3.03	3.35	2.71	3.26	4.65	4.12	4.57	-1.30	-4.42																								
1967	1.79	2.31	2.06	2.21	1.61	.04	1.04	1.00	.03	.35	-4.76	-7.93	-11.32																							
1968	1.14	1.57	1.20	1.34	.72	-.05	.01	.51	-.50	-1.14	-5.30	-7.59	-9.14	-6.98																						
1969	1.53	1.95	1.71	1.00	1.20	.64	.77	1.30	.54	.17	-2.95	-4.13	-4.04	-.10	7.03																					
1970	1.55	1.95	1.72	1.01	1.33	.74	.00	1.36	.71	.41	-2.17	-2.97	-2.60	.49	4.41	1.05																				
1971	1.20	1.64	1.41	1.47	1.00	.44	.53	.93	.30	.00	-2.27	-2.95	-2.65	-.36	1.92	-.54	-2.07																			
1972	1.30	1.63	1.42	1.47	1.04	.53	.62	.99	.43	.17	-1.00	-2.32	-1.96	.03	1.04	.16	-.67	1.90																		
1973	1.29	1.61	1.40	1.45	1.04	.57	.46	1.09	.49	.26	-1.40	-1.09	-1.53	.21	1.49	.40	-.00	1.35	1.12																	
1974	.67	.93	.70	.71	.20	-.21	-.10	.07	-.47	-.76	-2.41	-2.09	-2.69	-1.39	-.44	-1.00	-2.79	-2.76	-4.05	-10.47																
1975	.65	.90	.60	.69	.29	-.10	-.15	.09	-.41	-.67	-2.17	-2.57	-2.34	-1.10	-.33	-1.51	-2.17	-1.99	-3.15	-5.22	.33															
1976	.81	1.06	.86	.00	.51	.00	.13	.37	-.00	-.30	-1.64	-1.96	-1.71	-.50	.24	-.70	-1.12	-.76	-1.34	-2.14	2.31	4.33														
1977	1.19	1.45	1.27	1.31	.90	.60	.67	.93	.55	.40	-.00	-1.03	-.71	.42	1.26	.56	.30	.93	.01	.73	4.76	7.05	9.05													
1978	1.42	1.67	1.52	1.56	1.26	.92	1.00	1.27	.93	.81	-.20	-.45	-.11	.98	1.00	1.24	1.16	1.75	1.70	1.92	5.27	6.97	8.32	6.00												
1979	1.59	1.84	1.70	1.75	1.47	1.16	1.25	1.52	1.22	1.12	.12	-.01	.34	1.30	2.16	1.69	1.67	2.25	2.35	2.56	5.30	6.60	7.40	6.32	5.03											
1980	1.84	2.09	1.96	2.02	1.77	1.40	1.59	1.84	1.59	1.52	.40	.51	.00	1.00	2.65	2.26	2.30	2.09	3.06	3.34	5.04	6.90	7.65	6.93	4.99	8.15										
1981	1.93	2.20	2.00	2.15	1.91	1.64	1.75	2.01	1.77	1.71	.86	.79	1.15	2.11	2.03	2.49	2.55	3.11	3.20	3.55	5.73	6.66	7.13	6.46	6.34	6.60	5.07									
1982	1.84	2.07	1.96	2.01	1.70	1.52	1.61	1.86	1.62	1.56	.74	.60	1.00	1.00	2.54	2.20	2.23	2.71	2.02	3.02	4.04	5.50	5.69	4.00	4.41	3.94	1.89	-1.19								
1983	1.85	2.00	1.96	2.02	1.79	1.55	1.64	1.87	1.65	1.59	.82	.76	1.07	1.90	2.52	2.20	2.23	2.66	2.76	2.93	4.54	5.00	5.10	4.43	3.96	3.49	1.90	.47	2.16							
1984	1.85	2.07	1.96	2.01	1.80	1.56	1.65	1.80	1.66	1.41	.87	.82	1.12	1.90	2.40	2.10	2.21	2.61	2.70	2.04	4.27	4.72	4.77	4.07	3.62	3.10	1.97	.96	2.05	1.93						
1985	1.93	2.14	2.04	2.09	1.80	1.66	1.75	1.97	1.76	1.72	1.03	.98	1.27	2.02	2.50	2.30	2.33	2.72	2.00	2.95	4.26	4.66	4.70	4.07	3.69	3.33	2.40	1.74	2.73	3.02	4.12					
1986	1.90	2.19	2.10	2.15	1.95	1.74	1.83	2.04	1.85	1.81	1.15	1.11	1.40	2.12	2.64	2.39	2.43	2.79	2.00	3.01	4.22	4.50	4.61	4.04	3.70	3.40	2.63	2.15	3.00	3.20	3.97	3.01				
1987	1.92	2.23	2.13	2.19	2.00	1.79	1.80	2.09	1.91	1.87	1.24	1.21	1.49	2.10	2.60	2.44	2.40	2.82	2.96	3.03	4.15	4.40	4.49	3.97	3.66	3.39	2.73	2.34	3.06	3.29	3.74	3.55	3.29			
1988	1.99	2.10	2.09	2.14	1.96	1.76	1.84	2.04	1.86	1.83	1.22	1.19	1.46	2.11	2.50	2.35	2.30	2.70	2.77	2.00	3.91	4.19	4.10	3.60	3.37	3.10	2.40	2.12	2.60	2.70	3.00	2.62	2.01	.79		
1989	2.03	2.23	2.14	2.19	2.01	1.82	1.90	2.10	1.83	1.89	1.32	1.29	1.55	2.10	2.43	2.42	2.45	2.75	2.82	2.93	3.89	4.15	4.13	3.67	3.39	3.15	2.41	2.30	2.01	2.92	3.12	2.07	2.56	2.38	3.63	
1990	2.01	2.15	2.11	2.16	1.90	1.80	1.80	2.07	1.90	1.87	1.31	1.29	1.53	2.13	2.56	2.34	2.30	2.67	2.73	2.02	3.72	3.95	3.92	3.40	3.20	2.97	2.46	2.10	2.61	2.67	2.79	2.53	2.21	1.05	2.39	1.16

BEST COPY AVAILABLE

4.3 Functional Access to Health Care

4.3.0 Introduction

One of the most critical access issues concerns the geographic distribution of health care professionals. Concern has been expressed for over 50 years about the geographic distribution of physicians. Our modern concern is centered on how the growth in the number of physicians is likely to influence and change the geographic mobility patterns of physicians. Our analysis is a national time-series simultaneous equation model. The regional distribution question is fundamentally a cross-section problem. Our cross-section model revealed that traditional economic forces were operating in the nationwide hospital and physician sectors. Based on this foundation, a model could be developed that would allow us to investigate this issue. That approach was developed independently.[7] Our approach is consistent with that used in the time-series model and the specific detailed results are consistent with the findings of the time-series model.

---

[7] Brown, L.J., Hixson, J.S., and Musgrave, G.L., Implications of the Surplus of Physicians for Geographic Distribution, Presented at the Western Economic Meetings in Seattle, Washington, July, 1983.

In this section, we present forecasts of the changing geographic distribution of primary care physicians. Forecasts are presented in terms of the number of U.S. counties having population-to-primary care physician ratios of 3500-to-one, the current criterion that most counties must meet to be considered for designation as a Primary Care Health Manpower Shortage Area (DHHS, 1980). The forecasts were made with a microsimulation model incorporating econometric relationships originally developed to investigate the existence of diffusion phenomena in relation to the increasing national supply of primary care physicians. The model and forecasting methodology are discussed later.

First we outline some of the background issues. Policy maker's concern over the maldistribution of physicians is almost universally expressed at the absence of an equal distribution of physicians, measured by the population-to-physician ratio. Is it appropriate to expect an equalization of physicians through an economic process? We think not. Sufficient empirical evidence is available to conclude that the distribution of physicians is largely determined by the distribution of economic demand for medical services. In particular, physician location demonstrates a definite hierarchical pattern in terms of the spatial distribution of physician specialties.[8]

---

[8] Lawlor, A.C. and Reid, J.T., "Hierarchical Patterns in the Location of Physician Specialists Among Counties," Inquiry, Spring 1981, 18, 79-90.

The likelihood of finding a physician of a given specialty in a community is related to its size, population density and level of economic activity. Unless demand is equalized across local markets for medical care, it is not likely that economic forces could result in an equalization of the distribution of physicians. Rather, the evidence about the nature of geographic distribution of physicians indicates that diffusion has been driven by changes in aggregate supply relative to demand. This is the basic finding that is consistent with our multi-equation model. Other researchers have found that recent rapid increases in the supplies of specialists have resulted in their movements into increasingly smaller towns. Conversely, they found that the overall decline in general and family practitioners resulted in their relative concentrations increasing in the more populace areas.[9] Changes in geographic distributions seems to operate at the margin of physicians' location decisions. Smaller areas of economic activity become more attractive as the concentration of physicians increase in relatively larger areas. This suggests that as the increasing number of family practice physicians continues to replace and augment the declining numbers of traditional general practitioners, increased geographic platykurticity of family practice distribution and other "primary care" physicians will also be observed in the future.

---

[9] Newhouse, J.P., Williams, A.P., Schwartz, W.B., and Bennett, B.W., The Geographic Distribution of Physicians: Is the Conventional Wisdom Correct? Rand Report R-2734-HJK/HHS/RWJ/RC, Santa Monica, 1982.

Most of the empirical research on changing regional distributions has been qualitative in nature. It has been aimed at rejecting the null hypothesis that change has not occurred. The evidence in favor of a changing geographic distribution has grown stronger with the passage of time. The effects of the increasing supplies of physicians have made themselves more apparent in changes in the geographic distributions of the various physician specialities. Little has been done, however, to measure rates of change or to predict the pattern of change that will occur as the supplies of primary care physicians begin to increase more rapidly. This section reports the results of applying an econometric model of the location of primary care physicians. It provides an estimate of their rate of change and forecasts future primary care physician-to-population ratios in U.S. counties.

4.3.1 An Econometric Model of Primary Care Physician Location

The econometric model used for the forecasts presented here was an extension of a model originally developed to investigate the existence of diffusion phenomena in relation to the increasing national supply of primary care physicians.[10] The model successfully detected the presence of market forces as a major determinant of the geographic distribution of primary care physicians, and yielded a provisional estimate of the speed of adjustment to disequilibrium in local markets for physician services caused by such events as deaths of local practitioners and demographic or economic changes in the local area.

The econometric relationships explain the process of physician location as one of dynamic adjustment to imbalances between supply and demand at the county level. Specifically, supply and demand equations that were fit to county data for the period 1975-1979 provide estimates of the rates of movement of primary care physicians into or out of counties in response to annual changes in supply relative to demand or demand relative to supply. Changes in supply are represented by changes in the number of primary care physicians. Changes in demand are represented by changes in population and personal income. County areas are distinguished by the State that they are in and according to whether they are metropolitan or nonmetropolitan counties. The relationships used for the forecasts were chosen from among several competing models of the local market adjustment process by the application of tests for specification error in econometric models. The theoretical considerations involved in specifying alternative forms of the equations used in estimating the relationships and choosing the final version of the model are fully described by Brown and Reid.[11]

---

[10] Brown, J.L., and Reid, J.T., "Equilibrium and Disequilibrium in Markets for General Practitioners: New Evidence Concerning Geographic Distribution of Physicians," in Advances in Health Economics and Health Services Research, Vol. 4, ed. R. M. Scheffler and L. F. Rossiter, JAI Press, Inc., Greenwich, Connecticut, 1983.

The econometric relationships are incorporated in a microsimulation forecasting model which makes a number of calculations to estimate the distribution of new primary care physicians to each county each year. For these forecasts, the initial conditions of the microsimulation are the number and age distribution of the active primary care physicians in each county in 1979 (the last year of the period for which the econometric relationships were estimated), and the population and per capita personal income in each county in 1980. Given the values of these three variables, a supply/demand gap is first calculated for each county using the econometric relationships described earlier. The gap is the difference between the number of primary care physicians in 1979 and the predicted number which will be demanded in 1980 based on changes in population and per capita personal income over the year. In the second calculation, the current year's new primary care physician supply is allocated among counties. The allocation is based on the size of each county's gap calculated in the first step, and a random component related to the size of each county's share of the total primary care physician supply.

---

[11] Ibid.

This calculation thus generates the beginning number of primary care physicians for the current year and their age distribution. Another calculation then ages the current supply one year to the end of the current year. The relevant distribution of age-specific death rates and retirement rates are then applied to calculate the number of active primary care physicians in each county at year's end. This calculation then becomes one of the initial conditions, together with the next year's population and per capita personal income, for iteration of the cycle of calculating the gap between supply and demand, allocating new additions to the total primary care physician supply, and the aging, death, and retirement process.

4.3.2 Forecasts to 1990

The following forecasts are presented to show the general trends in access to health care. They are in terms of physician-population ratios. It is well understood that access is a complex issue and not simply a matter of these ratios. It is also true that the competitive pressures generated by the increasing numbers of physicians is a complex issue as well. This study is an example of how these two issues are interrelated. Nevertheless, in the case of functional access, physician-population ratios have an important place, are used by policy makers and are amenable to our analytic forecasting methodology. Other more subjective measures are not. To predict future values one can only trend the actual values or obtain concensus opinions if these other methods are adopted. If the former method is selected, we will probably never predict a break or turn in the trend. If the latter method is chosen we are left with the question of how these judgements are formed, how they change and who are the opinion leaders.

It should also be mentioned as a preface to our actual results that our model is driven by new physicians. We have not specifically modeled the mobility of existing practitioners. Our distributional change model is based on the new additions to the market. To the extent that established doctors reinforce this trend we would have greater dispersal of physicians to less well served areas. On the other hand, if the cost of capital is significantly increased, the establishment of solo practice could be retarded. With these points in mind we present the quantitative forecasts.

Table 4.11 shows how the number of counties with population-to-primary care physicians ratios greater than 3500-to-one will fall in the forecast period. The table displays compound negative growth. For example, we see that the year-to-year rates increase in absolute values from 1982-1983 through to 1988-1989 and then slow. This is seen by scanning down the diagonal from -5.29 to -9.06 and then -4.41. This means that the total number of counties with physician to population ratios greater than 3500-to-one fall from about 900 to about 500 in the decade.

We can disaggregate this metropolitan and nonmetropolitan county classification. Nonmetropolitan counties dominate these underserved areas amounting to close to 85 percent of the total. Their rate of change is shown in Table 4.12. Because they are such a large percent of the total, they dominate the result. Over the whole period, the reduction in these underserved areas progresses at a slower pace than metropolitan counties. Year-to-year changes show a somewhat different pattern. The major difference appears in the 1987 and 1988 periods where nonmetropolitan counties show a smooth pattern of improvement. Table 4.13 displays the growth rates for metropolitan counties. The diagonal elements for 1987 and 1988 show that these two years have much higher decreases than those for nonmetropolitan counties. Part of this result comes from the relatively small number of counties. But more of the result is from the equilibrating and market competitive forces that produce uneven growth patterns -- exactly what one sees in actual market processes.

Our methodology was also applied to counties with relatively more physicians and yet considered to be underserved. We grouped counties in clusters based on ratios of, from 3500-2999-to-one, from 3000-2499-to-one and from 2500-1999-to-one. The rates of change for these three classifications are displayed in Tables 4.14, 4.15 and 4.16. They show how the numbers of underserved counties decrease as new physicians seek better practice opportunities in relatively under doctored counties. In effect a county can move from one classification to another. A single category gains members from higher ratio counties when their situation improves, and loses members when they move to the better served category.

This overall pattern is consistent with a differential growth process. There is no clear cut expansion pattern in the sense of a simple cascade process. What we find is that the particular demographic and economic conditions of the county in conjunction with the physician situation determines the county's future position. This is an important consideration when understanding the interactions, simultaneity and symbiosis in the health care sector. We see that the overall growth rate for the 2500-1999-to-one category is forecast to be -5.18, for 3000-2499-to-one it is -8.78, for 3500-2999-to-one it is -9.85. The year-to-year patterns also show the same differential growth pattern where the individual county conditions determine the realizations within any particular category. One anomaly exists and that is the 1983-1984 change for the 2500-1999 group. The rate is positive. This simply means that more counties moved from the 3000-2500-to-one group (or higher ones) into this group than moved out. This is also consistent with a market oriented modeling effort in comparison to a mechanical distribution technique.

Table 4.11 COMPOUND RATES OF CHANGE IN THE NUMBERS OF COUNTIES WITH PRIMARY CARE PHYSICIAN TO POPULATION RATIOS OF 3500 to 1 OR MORE. (ALL COUNTIES)

YEARS	YEARS							
	1982	1983	1984	1985	1986	1987	1988	1989
1983	¯5.29							
1984	¯5.86	¯6.42						
1985	¯6.24	¯6.71	¯6.99					
1986	¯6.52	¯6.93	¯7.18	¯7.38				
1987	¯6.75	¯7.12	¯7.35	¯7.52	¯7.67			
1988	¯7.01	¯7.35	¯7.59	¯7.79	¯7.99	¯8.31		
1989	¯7.31	¯7.64	¯7.88	¯8.11	¯8.35	¯8.68	¯9.06	
1990	¯6.95	¯7.19	¯7.31	¯7.38	¯7.38	¯7.28	¯6.76	¯4.41

Table 4.12 COMPOUND RATES OF CHANGE IN THE NUMBER OF COUNTIES WITH PRIMARY CARE PHYSICIAN TO POPULATION RATIOS OF 3500 to 1 OR MORE. (NON-METROPOLITAN COUNTIES)

YEARS	YEARS							
	1982	1983	1984	1985	1986	1987	1988	1989
1983	¯5.04							
1984	¯5.66	¯6.28						
1985	¯6.11	¯6.65	¯7.00					
1986	¯6.51	¯7.00	¯7.35	¯7.69				
1987	¯6.77	¯7.20	¯7.50	¯7.75	¯7.81			
1988	¯6.93	¯7.30	¯7.56	¯7.74	¯7.77	¯7.72		
1989	¯7.20	¯7.55	¯7.80	¯8.00	¯8.10	¯8.25	¯8.78	
1990	¯6.86	¯7.12	¯7.26	¯7.31	¯7.21	¯7.01	¯6.65	¯4.47

Table 4.13 COMPOUND RATES OF CHANGE IN THE NUMBER OF COUNTIES WITH PRIMARY CARE PHYSICIAN TO POPULATION RATIOS OF 3500 to 1 OR MORE. (METROPOLITAN COUNTIES)

YEARS	YEARS							
	1982	1983	1984	1985	1986	1987	1988	1989
1983	¯6.72							
1984	¯6.96	¯7.20						
1985	¯6.94	¯7.05	¯6.90					
1986	¯6.59	¯6.55	¯6.23	¯5.56				
1987	¯6.65	¯6.63	¯6.44	¯6.21	¯6.86			
1988	¯7.49	¯7.64	¯7.75	¯8.04	¯9.25	¯11.58		
1989	¯7.96	¯8.16	¯8.35	¯8.71	¯9.74	¯11.15	¯10.71	
1990	¯7.47	¯7.58	¯7.64	¯7.79	¯8.34	¯8.83	¯7.42	¯4.00

Table 4.14 COMPOUND RATES OF CHANGE FOR COUNTIES WITH PRIMARY CARE PHYSICIAN TO POPULATION RATIOS BETWEEN 3500 and 2999 to 1.

YEARS	YEARS							
	1982	1983	1984	1985	1986	1987	1988	1989
1983	¯4.12							
1984	¯1.70	.78						
1985	¯1.78	¯.59	¯1.94					
1986	¯2.99	¯2.61	¯4.26	¯6.52				
1987	¯3.15	¯2.91	¯4.11	¯5.17	¯3.81			
1988	¯4.78	¯4.91	¯6.29	¯7.69	¯8.27	¯12.53		
1989	¯5.44	¯5.66	¯6.90	¯8.09	¯8.61	¯10.93	¯9.30	
1990	¯5.18	¯5.33	¯6.31	¯7.16	¯7.32	¯8.46	¯6.36	¯3.32

Table 4.15 COMPOUND RATES OF CHANGE FOR COUNTIES WITH PRIMARY CARE PHYSICIAN TO POPULATION RATIOS BETWEEN 3000 and 2499 to 1.

YEARS	YEARS							
	1982	1983	1984	1985	1986	1987	1988	1989
1983	¯.51							
1984	¯3.64	¯6.67						
1985	¯4.91	¯7.04	¯7.42					
1986	¯5.10	¯6.58	¯6.53	¯5.64				
1987	¯6.64	¯8.11	¯8.59	¯9.17	¯12.58			
1988	¯6.14	¯7.23	¯7.37	¯7.35	¯8.20	¯3.60		
1989	¯7.57	¯8.69	¯9.09	¯9.51	¯10.76	¯9.84	¯15.67	
1990	¯8.78	¯9.90	¯10.43	¯11.02	¯12.31	¯12.22	¯16.24	¯16.81

Table 4.16 COMPOUND RATES OF CHANGE FOR COUNTIES WITH PRIMARY CARE PHYSICIAN TO POPULATION RATIOS BETWEEN 2500 and 1999 to 1.

YEARS				YEARS				
	1982	1983	1984	1985	1986	1987	1988	1989
1983	¯2.63							
1984	¯4.22	¯5.79						
1985	¯4.87	¯5.97	¯6.15					
1986	¯5.40	¯6.31	¯6.57	¯6.99				
1987	¯8.24	¯9.60	¯10.83	¯13.08	¯18.78			
1988	¯9.83	¯11.20	¯12.50	¯14.53	¯18.06	¯17.34		
1989	¯10.33	¯11.55	¯12.66	¯14.22	¯16.50	¯15.34	¯13.29	
1990	¯9.85	¯10.84	¯11.66	¯12.72	¯14.09	¯12.47	¯9.93	¯6.45

4.3.3 Summary

The complexity of the health care markets in terms of interactions and simultaneous relations makes any summary difficult. Our findings are, that competition, fostered by the growing numbers of physicians, will have significant impacts on improving access to health services. One of the most significant findings is that competitive market forces will have their conventional rather than perverse effects on the industry. From the financial access perspective, the model forecasts slower growth in prices. Inflation adjusted expenditures in the private sector are moderated by the increasing intensity of competition. Real government expenditures for hospital services follow their post 1967 trend. The growth in real government expenditures for physician services is slowed, but they continue to increase at a rapid rate. We briefly discussed the often forgotten link between poverty and health. One cause of lower income is lower health status. This link, and its importance is not always appreciated. An implication of this is that access or the lack of it is a symptom of poverty rather than a cause for increased poverty. Of course, the implication is that the focus of policy should be poverty itself as well as improvements in the health care system.

Finally, we found these national trends to be transmitted to the local county levels. Physicians, apparently driven by economic opportunities, are forecast to locate in less well served areas. Particular economic and demographic conditions as well as the existing situation in each county determines the movement into the county. So it is not a simple or mechanical process. But, our results are consistent with a significant improvement in access to care as a result of the projected numbers of new physicians.

5.0 ANALYSIS OF THE POTENTIAL IMPACT OF THE PHYSICIAN SURPLUS UPON THE SYMBIOTIC RELATIONSHIP OF PHYSICIAN BEHAVIOR, ACCESS TO, AND COST OF MEDICAL CARE

This section contains the discussion of the basis for the interrelations or symbiotic relations between physician behavior, access to, and cost of medical care. The primary link between these three elements is the current and growing competition within the health care sector. Part of that competition is fostered by the change in regulatory philosophy and policy. A larger part of the competitive imperative comes from the growing numbers of physicians. While we discussed at length why the term physician "surplus" is technically questionable at this point, the term physician and hospital competition is appropriate. This section will explain how competition, fostered by regulatory change and the growing numbers of physicians, is the link between cost, access and behavior. We will use the classification system we initially proposed, namely structure, conduct and performance, to explain these aspects.

5.1 Structural Relations

Our analysis was based on considerations related to the structure of the health care industry. The foremost consideration was the growing *number of physicians*. We considered the total number of physicians rather than the number of active or full-time equivalent physicians. This is because economic condition and competitive conditions within the physician sector will actually determine the number of active physicians. Active physicians should be endogenous to any model rather than being an exogenous variable.

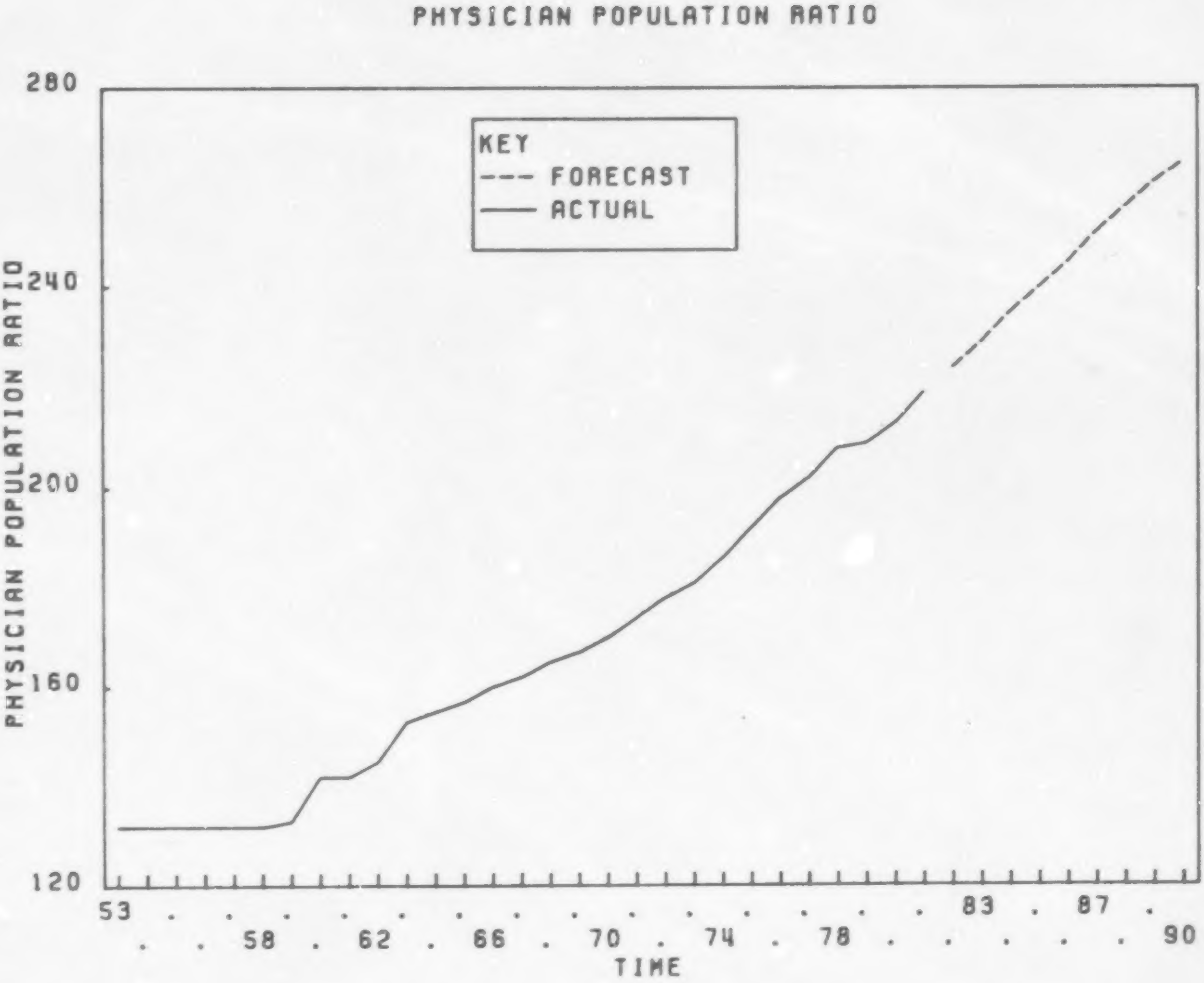
Because of the importance of the physician growth pattern, we were careful to select data and the forecasted exogenous path of these data. Our approach was to utilize a subsidiary model developed by the HRSA Office of Data Analysis and Management.[1] The model is a stock adjustment enrollment model of the physician sector. These data are the input to a demographic 'birth-death' model that ages the physician population based on occupational mortality parameters. The model projects an increase in physicians from 210,900 in 1953 to 662,259 in 1990. The per capita data are shown in Figure 5.1. In 1953, there were approximately 132 physicians per 100,000 people. We forecast the ratio to be 265 in 1990.[2]

---

[1] Jesse S. Hixson, "Budget Retrenchment and Health Manpower: Anticipated Effects on Medical, Dental and Nursing School Enrollment," presented at The American Economic Association Meetings, Washington, D.C., December, 1981.

[2] If we had used active physicians, the figures would have been 142 for 1953 and 236 for 1990.

Figure 5.1


PHYSICIAN POPULATION RATIO
KEY
--- FORECAST
— ACTUAL
PHYSICIAN POPULATION RATIO
280
240
200
160
120
53
58
62
66
70
74
78
83
87
90
TIME

As can be seen, the per capita growth is a relatively smooth exponential path from 1963. Structural change in the industry is the result of a long-term process of growth in the number of providers and regulatory change. One of the important factors to consider is that competition is apparently a cumulative process. At low physician population ratios, few competitive forces may be recognized. However, at successively larger ratios, competition not only intensifies but changes form. How that change is manifested is discussed in the Behavior section. What we see here is the critical link between structure and behavior. The link is between both growing numbers of physicians and regulatory change and the methods of competition. These methods are the behavioral actions taken by providers and others to compete in the health care market. If the market structure changes from less to more competitive, as measured by physician population ratio, or income per physician, or average number of patients seen per day, then the methods used to maintain economic position change. Changes in regulations influence the methods or tactics used to compete -- the actual behaviors -- but the competitive forces mount as the number of physicians grow. There is no technical or absolute level where competition begins and a change in behavior commences.

Specialization in the professional sense is also influenced by the economic conditions in the industry.[3] We know that competition leads to more efficient utilization of resources and that change is the symbiotic link between structure and performance. Generally, in industrial economics, this means more specialization. From the time of Adam Smith's discussion of the pin factory in 1776, economists have been aware of this competitive result. However, competition can also produce generalization. Because we have found that orthodox economic analysis is applicable to the health care industry, we can infer the following results.

Specialization and generalization are likely to occur as a result of the growing numbers of physicians and the intensification of competition. In contrast to noncompetitive situations where specialization could be a device to "meter the monopoly," specialization and generalization will lead to increased economic efficiency. Increased efficiency in this sense means total marginal cost will be closer to total marginal revenue. Our results can be interpreted as predicting that some specialties and subspecialties would become much more specialized and others would move to greater generality. For example, pediatrics may expand to serve the needs of adolescents, young adults and possibly deal with behavioral problems of drug and alcohol abuse. At the same time pediatric surgeons may be specializing in neonatal micro surgery. Some specialists may change their medical specialization basis such as gynecology and, in effect, become general practitioners with a special understanding of women's medicine. How competition will alter the structure of the industry by changing the specialties is an interesting and relevant question. To answer that question, one needs to know how the public will react to specific experiments, the trial and error process of market conflict. How a community or communities in general react to surgi-centers in shopping centers determines how this form of treatment will alter the structure of the health care industry. We might also note that the efficiency that is promoted is that of the whole system, not only that of the provider. For example, it may be most advantageous for the provider to tightly schedule visits and have substantial waiting time in the reception area. Competition may result in early morning, noon time, after work and weekend schedules for physicians, where patients can schedule appointments at their convenience. Some or all of these changes may be fighting words to some physicians and professional organizations. How they will react is another uncertainty, however, after careful consideration and experience with competition, the results may be clear. Few will be able to insulate themselves from competition. The winners will be those who accept the competitive challenge and take steps to act in anticipation of future changes, rather than react or attempt to move back to a precompetition era. Because of the reward system of the market, we believe these will be the impacts on the structure of the industry and how the changing structure will impact on the cost of health care.

---

[3] We attempted specialty specific estimations for primary care. Because our preliminary results were statistically unstable, we did not attempt to pursue the issues and obtain quantitative estimates.

How these specialists *differentiate their service* is closely related to how specialization develops. The analysis implies that both specialization and generalization will occur. Certainly there will be informational compaigns promoting, directly or indirectly, the virtues of each development. Equally likely is the fact that professional disputes will continue to exist as to which group is best able to meet particular needs. When economic pressures are added to the conflict, more overt methods of product differentiation may develop. In the section after next we will discuss how regulations might be used to differentiate the product. Next we will discuss how practice organization is likely to change as a result of the projected increase in the number of physicians.

Practice organizations will also be changed, to some extent, by the growing numbers of physicians. The formal or legal organization is a function of tax law and other legal issues, such as limited liability rather than an economic result of market economics. The economic organization of medical practice is another matter.

Economists have considered the advantages of group practice -- be it either multi-specialty or single-specialty groups. Generally they found some, but relatively low, degrees of economies of scale. This research was generally conducted before competition was an important factor in health. The studies were generally cost based and considered issues connected with more effective purchasing or auxiliary staffing issues.[4] In the coming era of intense competition these matters will be significant, but pale in the light of new developments.

Organizations of all forms, in health and other industries, provide security and are able to combine resources that are otherwise diffuse. As competition intensifies, the importance of economic security and the necessity of practicing good business as well as good medicine will dominate. Both single-specialty and large multispecialty organizations will grow. Economic necessity will promote efficient business management including financial, labor relations, site selection and multigroup purchasing organizations and professional marketing. Marketing will grow in sophistication from being concerned about advertising (still an emotional issue) to research analysis of economically viable potential markets and how to serve unmet needs. Whether more physicians will be salaried as a result of the growing numbers of physicians is an interesting unknown. It is especially interesting to new physicians who will be more than ever before engaged in group practice.

---

[4] For a further discussion of these issues, see Paul Feldstein, "The Physician Services Market," in Health Care Economics, John Wiley, 1979.

New physicians will find the *conditions of entry* into practice increasingly difficult. Increased competition means that new entrants will have more difficult economic prospects than existing providers. Entry will have to be into the less well served areas, on the basis of meeting an unserved need (time, convenience, price). If the physician enters with an undifferentiated service, his or her gain will be at the expense of existing providers. Financing this new venture may appear to be highly risky for a new physician, without business or managerial experience. As medicine becomes more capital intensive, new entry costs increase with the rising cost of capital. These are all costs of entry into solo practice. Group practice entry costs are less, and this relative differential is likely to stimulate group practice in preference to solo practice. In our discussion we tactically included a wide range of organizations in our definition of 'group practice'. Certainly organizations from HMO's to the military will have less difficulty attracting suitable candidates and will be more prone to discharge those who do not meet expectations. All of these conditions will make the entry conditions for USFMG's considerably more difficult than they are now. These people, to a large extent, will be the source of "grass roots competition." It is likely that they will be the ones dispersing into the less urban areas. It is likely that they will be seen as the competitive problem, because it is these physicians who have to compete in the most fundamental economic ways -- working longer, harder, in less desirable locations for lower economic returns. Our results would imply that those who seek to reduce competition will seek to limit or eliminate USFMG's as competitors. This is true even though the vast majority of USMG physicians would not select these entry points to medical practice. Our result is obtained because limiting or restricting entry at the lowest level has impacts at successively higher levels of practice endeavor.

Regulations in the health sector have been reduced substantially over time. It is outside the scope of this project to detail the deregulation movement in the health care field. Health care professionals are well aware of the numerous changes that have occurred. For an interesting summary of some of the relevant issues in the context of competition, the reader is referred to Judith Gelman's Competition and Health Planning, Bureau of Economics Federal Trade Commission, April 1982. Her long and intensive Chapter III on Regulations and Their Interaction with Competition is particularly informative.

The net effect of deregulation has been to foster a more competitive health care market. At the same time, the special character of the health care industry differentiates it from other industries. Considerably less competition has been deemed appropriate in health than in other industries. Our model and analysis is based on the historical and current levels of regulation and made no projections of future regulatory levels. To the extent that regulations were to be reduced in the future, we would expect greater behavioral variability in the forms of competition, but not in their fundamental nature.

Also, our analysis would imply that reregulation and changes in regulations would be sought by members of the profession to protect itself from increased levels of competition. This is the now orthodox economic analysis of regulation as first developed by the nobel laureate, George Stigler. However, as deregulation progresses it may be difficult for any profession, and medicine in particular, to successfully reregulate.

A second set of regulations must be briefly noted and these concern the reimbursement rules for Medicare and Medicaid. As these regulations change to include ESRD or liver transplants, they have both aggregate effects on all health costs but dramatic effects on specific groups of patients and providers. Major structural changes to the reimbursement systems such as the adoption of DRG's would be expected to have far reaching impacts on hospitals. Changes in HCFA regulation concerning hospital based physicians, establishing special rules for payment of radiology, pathology and anesthesiology services could have significant impacts on how these specialties are conducted. These changes can have important long-term structural changes on the industry. In our model, the structure changes slowly in response to competitive forces. That changing structure accommodates different competitive modalities and results in changes in costs and changes in access. Large exogenous changes to the system may take a decade to be fully appreciated. For example, the health manpower programs of the 1960's are achieving some of their goals today. Some would say over achieving their goals. Nevertheless, as producers and consumers of long run forecasts of economic activity, we need to be particularly cognizant of the long process times prior to making evaluations of new policy alterations.

As competition increases, new forms of practice organizations will seek ways to locate and serve new *numbers of potential patients*. To meet the pressures of competition, they will have to reorganize, including *horizontal and vertical integration* of their operations. Horizontal expansion of for-profit hospitals, satellite operations of all forms of hospitals and group practices is now commonplace. Vertical integration is less developed, but certainly we would expect to see bids of large hospital chains for the purchase of pharmaceutical firms. Also, we would expect vertical integration in the sense of hospitals opening physician offices, nursing homes and free standing psychiatric centers. Major new systems of free standing facilities:

Birthing Centers
Diagnostic Centers
Hospices
Occupational Health Centers
Primary Care Centers
Surgery Centers
Urgent Care Centers
Wellness Centers

The extent and diversity of future changes depends more on individual creativity than on economic analysis.

Finally, we mention the structural issues surrounding *insurance* and other *third parties*. We discussed expenditures by private insurance for hospital and physician services and total third party payments as well. The impact of the projected growing numbers of physicians was the primary focus of that discussion. Here we want to emphasize that insurance, as we know it, is a result of the tax system, not the health care system. Business firms can pay their employees in tax free health care because, while the payment is a tax deductible expense for the firm, it is tax exempt as are the benefits for the employee. In the public finance literature, this is called a "tax expenditure." As if the subsidy to health care was financed by a tax forgiveness. Certainly insurance has structured the industry and that structure has a separate influence that interacts with access and behavior, in addition to its cost imponent.

While the tax subsidy of insurance promotes higher health care expenditures, it was far from the dominant influence. The health care sector is a highly interrelated and interacting economic system.

This brief discussion of the interrelations and our discussion of the changing nature of the interactions or symbiosis is but an introduction.

5.2 Behavioral Relations

5.2.1 Introduction

Changes in the economic structure of the health care industry leads to actions taken by health care providers. Actions or behaviors of physicians are the subject of this section. In the next section we will discuss the impact these behaviors have on the performance of the industry as measured by access to health care.

In the previous section we found that the structure of the industry became more competitive with the growing numbers of physicians. The impact of competition is to reduce a moderate price escalation. The rate of increase in total health expenditures was predicted to moderate as well. But the growth is still substantial. Health problems are forecast to account for an increasing share of personal disposable income over the next decade. The same general trends are forecast to carry over to private insurance expenditures. Government expenditures on physician services are expected to increase but at a reduced growth rate, while government expenditures on hospital services will increase at their historical rate. The model says that direct expenditures increase in the future. How will these changes occur?

Exactly how particular actors in the market will behave in response to an increase in competition is impossible to predict. The general competitive behavior of all of the participants can be investigated. We will discuss how two major classes of behavior are linked and will influence the symbiotic nature of the industry. These two classes of behavior are those that attempt to retard or eliminate competitive pressures and those that attempt to profit or capitalize on the opportunities afforded by competition.

A final note on behavior is important. The health care industry is in an era of new competition. One force is deregulation; the other force is increasing numbers of physicians. As in financial and transportation, deregulation increased competition and generated substantial change in the structure, conduct and performance of the industry. Health care is expected to go through an equivalent transition that is apparently in its initial stages now. Public news stories and much of the medical trade publications will focus on the behavioral aspects of competition. Industry analysts are advised to remember the link between structure, conduct and performance and how they are related to each other.

5.2.2 Anti-competitive Behavior

The first set of behavior we present is the anti-competitive actions physicians and others are expected to exhibit in the face of competitive pressure. These anti-competitive behaviors can be further disaggregated into economic and political activities. The political activities are in the nature of modification to existing law. Economic actions will be generated by the same economic forces that motivate the competitive actions we present in the next section. Both competitive and noncompetitive actions will be accompanied by arguments extolling the virtues of the action. Economists have found that every industry believes it is a special case and what might be true everywhere else is different in their case. The health care industry is a case where this belief is held outside the industry as well. Future developments in anti-competitive behavior will depend on the extent to which industry proponents can influence policy makers in this direction.

Political Behavior

Every industry seeks special consideration from the government. Most recently, organized medicine sought exemption of all learned professions from Federal Trade Commission jurisdiction as we discussed. The argument was that they were already regulated by the Federal Justice Department, various state practice acts, and in some cases antitrust legislation. The argument was essentially a procompetitive argument to achieve an anticompetitive result. Along with the FTC action that received extensive national publicity, additional legislation was drafted to exclude physicians from coverage by the Sherman Antitrust Act. In addition, legislation was proposed to exclude physicians and other learned professions from state antitrust authority.

While these attempts have not been successful, they were far from total failures. Considerable support for the name deregulation continues to exist. Strong support exists for any method to contain cost escalation. The medical profession was successful in convincing many political leaders about the merits of this legislation. The stumbling block was that they could not show that the apparent decrease in competition that could result from their proposal would reduce costs or benefit the general public.

Because the model predicts continued competitive pressures, we expect legislative efforts to reduce competition will continue. The major efforts will continue on the federal level. At the state level one would expect to see attempts to modify state practice acts to reduce competition between physicians and the allied health professions. As direct competition intensifies between hospitals and physicians, we expect to see legislative proposals to limit the scope of hospital expansion.

The nature and extent of these proposals depends on local support and creativity of the advocates. In the past they have been able to partially rely on the target income hypothesis as supporting their position. Subsequent research has virtually discredited that concept among professional economists. Pressures for national comprehensive health care also seem to be substantially less than in the past. If our forecasts are correct, there will be little support for comprehensive insurance, but support for catastrophic insurance may increase. This could be seen as one way to alleviate some economic pressures brought on by competition. These are all political pressures. The challenges in the marketplace will generate direct economic anticompetitive behaviors as well. They are discussed next.

Economic Behavior

The model predicts increased competition, and competition of this form is new to the health care industry.

One should expect behavior of physicians to parallel that exhibited by others in similar competitive situations. One reaction will certainly be anticompetitive. The one difference may be that because physicians do not generally have formal training in business or commercial law, they may be unaware of the relevant laws.

Price agreements among competitors or potential competitors in any form will be considered to be anticompetitive. This is true even if there are agreements to establish maximum prices -- as we found in the Maricopa case. It will seem strange to some that the government can fix prices by use of reimbursement policy, but private agreements between providers are forbidden. But this and numerous other results are accepted and understood outside the health industry.

Exclusive dealing arrangements, boycotts and tying agreements will be other avenues pursued by physicians and hospitals in coping with increased competition. The courts will eventually decide the conditions under which actual or potential competitors can be excluded from any economic activity. The current practice of closed departments or closed staffing would be one area of concern. As hospitals are under increased pressures, they may also be less willing to exclude providers who would utilize their facilities. These potential and actual conflicts will certainly intensify over the next decade.

The interrelations are interesting. If closed staffing is in the economic interests of existing physician attendees, part of that economic or noncompetitive return can be extracted by the hospital. In effect, it is a shared return. Hospitals can develop charge back or metering devices to regain part of the extra return the physician earns because his competitors do not have admitting privileges. This sets in motion a whole series of new economic conflicts between physicians and hospitals.

Growing numbers of physicians without admitting privileges would be a potential source for the development of new HMO's. A hospital and the existing physicians would have to consider the ramifications of any of these anti-competitive moves, because they generate competitive reactions in their own right.

Finally, we note that the government will not be a disinterested observer of these actions. One response that HCFA and other third party payers might adopt is to set DRG's to include physician services. This could be done explicitly with a separate fee or left for the hospital to negotiate with physicians. In this latter case, hospitals might be an added competitive force altering physicians' behavior.

All of these results are consistent with the specifications of the model and our research results. We have attempted to deal with the broad views that are important to the policy debate. We found a number of parallels between the new competition in health care and the recently deregulated industries. The model predicts change but not unprecedented change in the health industry. The model implies new conflicts between physicians and hospitals. But these conflicts are not more substantial than those engaged in between retailers and shopping mall owners. Can the mall exclude a second book store because it already has one is equivalent to the open staffing question. Malls use differential rate structures and overrides on set sales to meter their noncompetitive return, very similar to our findings for hospitals. The systematic exclusion of one group of sellers influences the development of competing centers. While we do not wish to push this analogy too far, we do intend to show that the behavioral changes we expect are normal to most business activity and do not pose a radical threat to physicians or the health care industry.

5.2.3 Pro-competitive Behavior

The second set of behaviors that are consistent with our model are pro-competitive or simply competitive actions. As we discussed earlier, competition in the model is defined in the Hayek Meaning of Competition sense-actions of endeavoring to gain what another endeavors to gain at the same time. Entrepreneurial or business competition as opposed to pure or perfect competition is our central focus.

Our results are consistent with four areas of competition. These are related and they are one set of links that interconnect the relations between structure, conduct and performance. The four areas are:

- Competition for increased health expenditures
- Competition among other physicians
- Competition with allied health professionals
- Competition with hospitals.

This is, in effect, a continuation and expansion of the discussion in the chapter on behavior.

Competition for Increased Health Expenditures

Producers of health care services compete with producers of all other goods and services. Health care sellers have been particularly successful in obtaining increased sales and a growing share of the consumer's dollar. Part of that growth is due to the tax incentives we discussed. The model forecasts increases in these expenditures as can be reviewed in Chapter 2. Even though the rates of acceleration are predicted to diminish, expansion will occur. Table 5.1 shows the inflation adjusted compound growth rates for physician services, and Table 5.2 shows the rates for hospital services. Physician services are forecast to decelerate, but they continue to outpace hospital services. Hospital services are predicted to generally follow their historic trend, but at a somewhat reduced rate.

Using these measures of behavioral change, the model predicts change but not of a radical nature. Increases in the numbers of physicians will have impacts that are consistent with those found in other industries. However, because the health care industry is not accustomed to competitive change, that fact may be important to understanding how the projected increase in number of physicians will alter the interrelations in the industry

Competition with Other Physicians

One behavioral change is to forego the pleasures, both personal and professional, of city life and practice in less urban communities. In effect, to compete is by locating where there is less or no local competition. This is another behavioral result that is consistent with our model.

A second behavioral change is to change specialty patterns. Our model implies that some physicians would

Table 5.1 COMPOUND RATES OF CHANGE OF TOTAL PHYSICIAN ADJUSTED EXPENDITURES ON HOSPITAL SERVICES

YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
1955	[illegible]											
1956	3.30	6.90										
1957	3.59	5.56	4.17									
1958	4.54	6.19	5.00	7.44								
1959	5.23	6.65	6.55	7.75	8.06							
1960	4.53	5.52	5.16	5.40	4.52	1.09						
1961	4.04	4.77	4.34	4.30	3.30	1.12	1.14					
1962	4.42	5.10	4.00	4.92	4.30	3.00	4.00	7.11				
1963	4.34	4.93	4.65	4.73	4.19	3.24	3.97	5.42	3.75			
1964	5.29	5.92	5.79	6.02	5.79	5.34	6.43	8.25	8.03	14.15		
1965	5.23	5.79	5.66	5.05	5.62	5.22	6.07	7.33	7.41	9.20	4.62	
1966	4.69	5.15	4.97	5.06	4.77	4.31	4.05	5.61	5.24	5.74	1.76	1.02
1967	4.71	5.13	4.97	5.05	4.79	4.30	4.06	5.50	5.10	5.54	2.01	1.92
1968	4.53	4.90	4.73	4.70	4.52	4.14	4.52	5.02	4.67	4.85	2.65	2.00
1969	4.67	5.03	4.00	4.94	4.71	4.30	4.76	5.22	4.95	5.15	3.44	3.14
1970	4.69	5.07	4.89	4.95	4.74	4.44	4.79	5.20	4.96	5.14	3.70	3.52
1971	4.33	4.62	4.47	4.49	4.26	3.95	4.22	4.53	4.25	4.31	2.90	2.70
1972	4.47	4.76	4.62	4.65	4.45	4.10	4.44	4.75	4.51	4.60	3.46	3.30
1973	4.49	4.74	4.63	4.66	4.47	4.22	4.47	4.75	4.54	4.62	3.61	3.40
1974	4.26	4.51	4.37	4.30	4.19	3.94	4.15	4.30	4.16	4.19	3.25	3.10
1975	4.24	4.47	4.34	4.35	4.17	3.93	4.13	4.34	4.13	4.17	3.30	3.17
1976	4.44	4.67	4.55	4.57	4.41	4.20	4.40	4.62	4.45	4.50	3.73	3.65
1977	4.30	4.59	4.40	4.50	4.34	4.14	4.32	4.52	4.35	4.40	3.60	3.60
1978	4.30	4.59	4.40	4.49	4.35	4.16	4.33	4.52	4.36	4.40	3.74	3.67
1979	4.37	4.57	4.46	4.40	4.34	4.16	4.32	4.50	4.35	4.30	3.76	3.70
1980	4.42	4.61	4.51	4.53	4.19	4.22	4.30	4.56	4.42	4.46	3.80	3.83
1981	4.45	4.64	4.54	4.56	4.44	4.27	4.43	4.60	4.46	4.50	3.96	3.92
1982	4.20	4.46	4.36	4.37	4.24	4.00	4.22	4.37	4.23	4.26	3.73	3.60
1983	4.23	4.39	4.29	4.30	4.17	4.02	4.15	4.20	4.15	4.17	3.67	3.62
1984	4.10	4.25	4.16	4.16	4.03	3.87	3.99	4.12	3.90	3.99	3.51	3.45
1985	3.90	4.13	4.03	4.03	3.90	3.75	3.85	3.97	3.81	3.84	3.37	3.31
1986	3.80	4.01	3.92	3.91	3.70	3.63	3.73	3.83	3.70	3.69	3.24	3.10
1987	3.79	3.92	3.82	3.81	3.69	3.54	3.63	3.73	3.59	3.59	3.15	3.00
1988	3.72	3.85	3.75	3.74	3.61	3.46	3.55	3.64	3.51	3.50	3.00	3.01
1989	3.73	3.85	3.76	3.75	3.63	3.49	3.57	3.66	3.53	3.52	3.12	3.06
1990	3.70	3.81	3.72	3.71	3.59	3.45	3.53	3.61	3.49	3.40	3.09	3.03

YEARS	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1967	4.94											
1968	3.55	2.17										
1969	4.57	4.30	6.64									
1970	4.69	4.60	5.04	5.05								
1971	3.46	3.10	3.41	1.03	-1.29							
1972	4.03	3.05	4.20	3.50	2.74	6.93						
1973	4.14	4.01	4.30	3.02	3.41	5.05	4.77					
1974	3.62	3.43	3.65	3.06	2.57	3.00	2.39	.87				
1975	3.65	3.49	3.60	3.19	2.02	3.69	2.00	1.95	3.06			
1976	4.13	4.04	4.20	3.95	3.76	4.00	4.20	4.11	6.20	8.59		
1977	4.03	3.94	4.14	3.04	3.66	4.51	4.03	3.05	5.14	5.79	3.07	
1978	4.07	3.99	4.10	3.91	3.76	4.51	4.11	3.97	4.97	5.35	3.77	4.97
1979	4.07	4.00	4.17	3.93	3.00	4.46	4.11	4.00	4.00	5.04	3.09	4.30
1980	4.10	4.12	4.29	4.00	3.90	4.50	4.29	4.23	4.94	5.15	4.31	4.73
1981	4.26	4.21	4.37	4.10	4.10	4.64	4.41	4.17	4.99	5.10	4.52	4.00
1982	3.90	3.92	4.04	3.04	3.74	4.21	3.95	3.06	4.34	4.41	3.73	3.06
1983	3.90	3.03	3.94	3.75	3.66	4.00	3.02	3.73	4.14	4.10	3.56	3.65
1984	3.71	3.63	3.73	3.54	3.43	3.00	3.54	3.43	3.70	3.77	3.10	3.19
1985	3.54	3.46	3.54	3.35	3.24	3.57	3.31	3.19	3.40	3.44	2.09	2.06
1986	3.39	3.31	3.37	3.19	3.07	3.37	3.12	2.99	3.24	3.10	2.66	2.61
1987	3.20	3.20	3.25	3.07	2.95	3.22	2.90	2.04	3.07	3.01	2.52	2.44
1988	3.20	3.12	3.16	2.90	2.07	3.12	2.09	2.76	2.96	2.09	2.43	2.37
1989	3.24	3.16	3.21	3.04	2.94	3.10	2.96	2.05	3.04	2.90	[illegible]	2.51
1990	3.20	3.13	3.17	3.01	2.91	3.13	2.93	2.02	2.99	2.93	[illegible]	2.50

YEARS	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1979	4.13											
1980	4.06	5.60										
1981	5.02	5.47	5.35									
1982	3.71	3.57	2.57	-.13								
1983	3.40	3.32	2.50	1.22	2.59							
1984	2.90	2.76	2.04	.99	1.55	.52						
1985	2.64	2.39	1.76	.00	1.21	.55	.50					
1986	2.30	2.13	1.57	.03	1.07	.57	.59	.61				
1987	2.24	2.01	1.50	.00	1.00	.71	.77	.04	1.11			
1988	2.16	1.95	1.50	.96	1.14	.06	.94	1.06	1.29	1.94		
1989	2.34	2.16	1.79	1.35	1.56	1.39	1.57	1.02	2.21	2.79	4.13	
1990	2.34	2.10	1.04	1.46	1.66	1.53	1.70	1.92	2.26	2.44	3.23	2.30

BEST COPY AVAILABLE

Table 5.2 COMPOUND RATE OF CHANGE IN TOTAL INFLATION ADJUSTED EXPENDITURES ON HOSPITAL SERVICES

RL7

YEARS	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1955	2.32																																			
1956	2.24	2.16																																		
1957	1.67	1.34	.53																																	
1958	2.15	2.09	2.05	3.59																																
1959	2.23	2.21	2.23	3.00	2.50																															
1960	2.54	2.50	2.69	3.41	3.33	4.00																														
1961	2.37	2.38	2.42	2.90	2.67	2.72	1.30																													
1962	2.11	2.08	2.07	2.30	2.00	1.91	.04	.31																												
1963	2.25	2.24	2.25	2.54	2.33	2.26	1.67	1.01	3.33																											
1964	2.36	2.36	2.30	2.65	2.50	2.40	2.00	2.32	3.34	3.35																										
1965	2.26	2.25	2.26	2.40	2.32	2.20	1.92	2.06	2.65	2.31	1.20																									
1966	2.44	2.45	2.40	2.70	2.50	2.59	2.34	2.53	3.09	3.01	2.05	4.45																								
1967	2.07	2.05	2.04	2.20	2.04	1.90	1.60	1.73	2.02	1.69	1.14	1.07	-2.19																							
1968	2.06	2.04	2.03	2.17	2.03	1.96	1.70	1.75	1.99	1.73	1.33	1.34	-.10	1.98																						
1969	2.05	2.03	2.02	2.15	2.01	1.96	1.73	1.77	1.98	1.76	1.44	1.40	.51	1.09	1.90																					
1970	2.03	2.02	2.01	2.12	2.00	1.94	1.73	1.77	1.96	1.76	1.50	1.55	.83	1.06	1.05	1.01																				
1971	1.78	1.75	1.72	1.81	1.67	1.60	1.37	1.37	1.49	1.26	.97	.92	.23	.04	.49	-.20	-2.17																			
1972	1.95	1.93	1.91	2.01	1.89	1.84	1.66	1.60	1.82	1.65	1.44	1.47	.90	1.62	1.56	1.45	1.27	4.82																		
1973	2.15	2.14	2.14	2.24	2.15	2.12	1.97	2.02	2.10	2.06	1.92	2.00	1.66	2.31	2.40	2.52	2.76	5.32	5.83																	
1974	2.23	2.22	2.23	2.33	2.25	2.23	2.10	2.15	2.31	2.21	2.10	2.19	1.91	2.51	2.62	2.76	3.00	4.79	4.77	3.73																
1975	2.23	2.22	2.23	2.32	2.25	2.23	2.10	2.16	2.30	2.21	2.11	2.19	1.95	2.40	2.56	2.67	2.85	4.14	3.91	2.97	2.22															
1976	2.17	2.16	2.16	2.24	2.17	2.15	2.03	2.07	2.20	2.11	2.01	2.08	1.84	2.30	2.35	2.42	2.52	3.40	3.15	2.27	1.55	.89														
1977	2.15	2.14	2.14	2.22	2.15	2.13	2.02	2.06	2.17	2.09	1.99	2.05	1.84	2.25	2.29	2.34	2.42	3.21	2.88	2.16	1.65	1.36	1.83													
1978	2.08	2.07	2.07	2.14	2.07	2.04	1.93	1.96	2.06	1.98	1.88	1.93	1.72	2.09	2.11	2.13	2.17	2.81	2.47	1.82	1.35	1.06	1.14	.45												
1979	2.08	2.07	2.07	2.14	2.07	2.04	1.94	1.97	2.07	1.99	1.90	1.94	1.75	2.09	2.11	2.13	2.16	2.72	2.42	1.86	1.50	1.32	1.46	1.27	2.10											
1980	2.12	2.11	2.11	2.18	2.11	2.09	1.99	2.03	2.12	2.05	1.97	2.02	1.85	2.16	2.19	2.21	2.25	2.76	2.50	2.04	1.76	1.67	1.86	1.87	2.59	3.08										
1981	2.13	2.12	2.12	2.18	2.12	2.10	2.01	2.04	2.13	2.07	1.99	2.04	1.88	2.18	2.20	2.22	2.26	2.72	2.48	2.07	1.84	1.78	1.96	1.99	2.50	2.71	2.33									
1982	2.17	2.16	2.16	2.23	2.17	2.15	2.07	2.10	2.19	2.13	2.06	2.11	1.97	2.25	2.27	2.30	2.35	2.77	2.56	2.21	2.02	1.99	2.17	2.24	2.69	2.89	2.88	3.27								
1983	2.15	2.14	2.14	2.20	2.15	2.13	2.04	2.07	2.16	2.10	2.03	2.08	1.94	2.20	2.22	2.25	2.28	2.66	2.47	2.14	1.96	1.93	2.08	2.12	2.46	2.55	2.37	2.39	1.52							
1984	2.11	2.10	2.10	2.16	2.10	2.08	2.00	2.03	2.11	2.05	1.98	2.02	1.89	2.13	2.15	2.17	2.19	2.54	2.35	2.04	1.87	1.83	1.95	1.97	2.22	2.24	2.04	1.94	1.28	1.03						
1985	2.08	2.07	2.07	2.13	2.07	2.05	1.97	2.00	2.07	2.01	1.95	1.99	1.86	2.09	2.10	2.11	2.13	2.45	2.27	1.98	1.82	1.78	1.88	1.88	2.09	2.09	1.89	1.70	1.29	1.17	1.31					
1986	2.05	2.05	2.04	2.09	2.04	2.02	1.94	1.97	2.04	1.98	1.92	1.95	1.82	2.04	2.05	2.06	2.07	2.36	2.19	1.92	1.77	1.73	1.81	1.81	1.98	1.96	1.77	1.66	1.27	1.10	1.25	1.20				
1987	2.03	2.02	2.01	2.06	2.01	1.99	1.91	1.93	2.00	1.94	1.88	1.91	1.79	1.99	2.00	2.01	2.02	2.29	2.12	1.86	1.72	1.67	1.75	1.74	1.88	1.85	1.68	1.57	1.24	1.16	1.21	1.16	1.11			
1988	2.02	2.02	2.01	2.06	2.01	1.99	1.91	1.93	2.00	1.94	1.89	1.91	1.80	1.99	2.00	2.00	2.02	2.27	2.11	1.87	1.73	1.70	1.77	1.76	1.89	1.87	1.72	1.63	1.36	1.33	1.40	1.43	1.55	1.98		
1989	1.99	1.98	1.97	2.02	1.97	1.95	1.88	1.89	1.95	1.90	1.84	1.87	1.76	1.94	1.94	1.94	1.95	2.18	2.03	1.80	1.67	1.63	1.69	1.68	1.79	1.76	1.61	1.53	1.30	1.24	1.20	1.27	1.29	1.30	.78	
1990	1.97	1.96	1.95	1.99	1.95	1.92	1.85	1.87	1.93	1.87	1.82	1.84	1.73	1.91	1.91	1.91	1.91	2.13	1.99	1.76	1.64	1.60	1.66	1.64	1.74	1.71	1.57	1.49	1.27	1.23	1.27	1.26	1.27	1.33	1.00	1.22

BEST COPY AVAILABLE

increase their specializations and others would generalize their practice. In effect, we would find a bimodel distribution resulting from the increase in physicians. The specialization could reach the level where consultants were used within a subspecialty to determine which microspecialist or specialty would be appropriate. At the other extreme, some specialists would have, in effect, a general practice. These results are consistent with increasing economic efficiency generated by the competitive pressures of increasing numbers of physicians.

The third fundamental way physicians will compete is through changing organizations. Because of the growing total expenditure levels, and the pressures to reduce health care costs, new pressures will be placed on the traditional office based physician. Large corporations and increasing numbers of small corporations will seek lower cost health care delivery systems. Physicians can be expected to begin their own HMO's and IPA's in response to competitive pressures. As group practice expands, we expect physicians to develop PPO's to aggressively solicit business from local employers. They can also be expected to propose competitive bidding systems as a way for business and government to reduce costs.

Of course, we will continue to see "professional" competition in all of its existing forms. In addition, we expect to see more territorial disputes between specialties and subspecialties. A separate group of conflicts will be between physicians and allied health professionals.

Competition with Allied Health Professions

Physicians will face additional competition from allied health professionals. Optometrists will be aggressively promoting their services and ophthalmologists responding by economic necessity. Psychologists will demand admission rights for their patients. While not at this extreme, psychiatrists will feel pressures from psychologists not only from creative marketing, but also direct price advertising. Without detailing all the potential conflicts with adversaries from anesthesiologists vs. nurse anesthetists to podiatrists vs. orthopedists, we know these disputes will break out. State practice acts will be the legislative battleground, the marketplace will be the economic field of battle.

One major result will be that the options available to the informed consumer will be widened. At the same time, since the level of service will also be subject to greater variation, consumers will need to become better informed about what these competing professionals can offer. Physicians and their professional organizations will, by economic necessity, have to explain why their services should be the treatment of choice as opposed to that of their allied health competitors.

Competition with Hospitals

Hospitals will be facing pressures on many fronts. Newly enacted DRG's are only a first step in this assault. While national planning has been hit by funding cuts, some states have instituted their own planning agencies, cost commissions and rate-review boards. When this is combined with pressures from changing demographic patterns, new entry competition from proprietary chains and others, it is easy to see that they must act. Of course when they do, physicians must act as well and the action-reaction symbiosis is altered.

One fundamental change is from the stylized hospital being thought of as a colleagually managed organization where the administrators are staff to the physicians who make the critical decisions, to the corporate hospital run by business executives who hire doctors on an hourly basis. Certainly these two extremes are far fetched, but they serve a purpose. The purpose is to explain that as competition develops the business aspects will grow in importance.

Equally important is that physicians will actively see the security these organizations offer in highly competitive environments. These organizations will allow the physician to practice under conditions that would otherwise be difficult or impossible. At the same time, these new hospital based organizations will provide more competition to existing physicians. This is the interaction between physician service market and hospital service market that our model attempted to capture (as well as the many other aspects discussed in this report).

How far hospitals will proceed in developing these new organizations and delivery systems will depend upon how they are accepted in the market. The following hospital based systems have met with varying degrees of market success.

- Birthing Centers
- Cardio-Pulmonary Evaluation Centers
- Diabetes Clinics
- Diagnostic Centers
- Executive Examinations
- Family Practice Centers
- Hearing Centers
- Home Health Care Services
- Hospices
- Nursing Homes
- Occupational Health Centers
- Physical Fitness Centers
- Primary Care Centers
- Retirement Centers and Communities
- Sameday Surgery Departments
- Surgi-Centers
- Urgent Care Centers
- Vision Centers
- Wellness Centers

Some of these are co-located within the hospital or satellite facilities. Others are completely separate facilities. The diversity of these services and their own internal organization is one indication of the intensity of competition we are currently beginning to see. Our model forecasts that these developments will continue and accelerate as competition progresses. As we will see in the next section, these developments will have important impacts on the performance of the health care industry. What we have seen is that these behavioral changes are consistent with the model and conventional economic analysis.

5.3 Performance Relations

5.3.1 Introduction

The term "access" does not have a straight forward definition in the health care literature. Its definition is often determined by the variables used to measure it (see Anderson and Aday). What most researchers seem to mean by the term is the ability to obtain needed or demanded services. An example of this definition by Parker who states, "accessibility (is) defined as the ability to reach, obtain or afford entrance to services." All of the elements we will mention impact on access defined in this way.

Access in this sense is a social goal which government attempts to promote through a variety of programs. However, when the abstract concept of access needs to be operationally defined, its measurement becomes a serious problem. It is not a problem because we have no definition. The problem is that access can mean almost anything. We believe this is because, what health care specialists want to appraise and promote is the performance of the industry. The element of that appraisal or activity are listed below.

Allocation efficiency
Technical efficiency
Inflation effect
Technological progress
Equity
Product quality

These concepts, especially the ones about allocative and technical efficiency, are alien to noneconomists. The other issues, such as equity and product quality, are among the most difficult for economists to empirically handle. It is not surprising that we find the research in this area to be disjoint.

Another suggested classification includes measures of structure that encompass the number and types of resources, their administrative organization, types of care provided and geographic distribution. The second category is called process and it measures or describes how the health care system translates the structure (where structure is defined as inputs) to outcomes (i.e., health system outputs).

In this case, outcomes are defined as the results of "passage through the health care delivery system." As can be seen, this view is not consistent with the structured form of analysis developed by the research of numerous industrial organization scholars, but it is focused on the health industry. A more detailed explanation of this classification is available in the Division of Health Professions Analysis publication (HRA 80-20) "Evaluation of Health Manpower Shortage Area Criteria," and this basic concept is also presented by Aday and Anderson in their book, Access to Medical Care.

We reviewed these concepts to insure that our approach was consistent with these objectives and also consistent with the discussion of access to medical care presented in the Third Report to the President and Congress on the Status of Health Professions Personnel in the United States, January 1982, pages IV-78, and IV-79 on "Access to Care." In that study, the term access to health care meant that individuals encounter no excessive burdens in obtaining an adequate level of health care, and that the costs associated with achieving such a state are distributed fairly. Burdens may include the costs of obtaining care, waiting and travel time and the cost and availability of transport.

5.3.2 Allocative Efficiency

Allocative efficiency means how close prices are to marginal costs. In everyday terms this implies that economic profits should be relatively low, if we have high efficiency. Of course, this is a strange definition for a business person to accept because, for that person profits are a reward for being efficient. In this report we cannot present a full explanation of these concepts. However, profits for economists mean not only a reward for assuming the normal level of risk in the industry and a reward for normal managerial diligence, they are also a return due to the lack of competition.

Competition, as it was used in developing the model, is the action of endeavoring to gain what another endeavors to gain at the same time. This definition is more consistent with what noneconomists understand competition to be. Another aspect is entry and exit of firms in response to existing or expected profits in the industry. Allocative efficiency means that consumers pay an amount equal to the costs of producing that good or service. Costs may be high because the resources needed to produce the product are in short supply relative to their other uses. Cost may be low because of their relative abundance. There is no absolute standard outside the laboratory of perfect competition to judge an industry as being competitive or noncompetitive. However, research continues to press on in the areas of understanding the impact of competition on performance as measured by allocative efficiency. The link between structure and behavior and performance we have investigated is access. As the number of physicians has increased, we are projecting increased access and that is hypothesized to increase allocative efficiency. Future work needs to be done to expand our knowledge of the extent to which competition increases in response to the projected growth in the numbers of physicians.

A second measure of active competition is the entry of new hospital physician service organizations. A comprehensive list of these new forms is not available, but we note the following major systems of providers.

- Primary Care Centers
- Surgi-Centers
- Urgent Care Centers
- Diagnostic Centers
- Birthing Centers
- Occupational Health Centers
- Wellness Centers
- Drug Dependence Centers
- Hospices

In addition, we could add HMO's, IPA's and PPO's. The entry of organizations is evidence of active competition. This is the organizational equivalent of the manpower entry of physicians into the health care market.

5.3.3 Technical Efficiency

Technical efficiency has come to mean two rather different things. One concerns wages of factors of production used in an industry as determined by the competitive forces. We have included that basic concept in our model when we incorporated the lagged nurse graduates in the physician and hospital supply models. We did not assess the returns to education in either nursing or medicine, in that such a study was beyond the scope of our work.

A second concept of technical efficiency is connected to a principle called X-efficiency or X-inefficiency. This is the concept that some may have in mind when they discuss problems of competition.

X-inefficiency is a form of deadweight loss. Value is not merely transferred from one party to another; it is lost to all. This deadweight loss is, in a word, waste. According to Harvey Leibenstein, who coined the term, X-inefficiency means "the extent to which a given set of inputs do not get to be combined in such a way so as to lead to maximum output."[5] When inputs are not producing the maximum output possible, there is error, inertia, spoilage, delay, red tape, or something similar. As a result, costs are higher than otherwise.

We stress that the X-inefficiency concept is not necessarily, or even usually, applied to cost problems that could be cured by massive alterations of plant scale, by adoption of new technology, or by invention of new technology. We think of it rather as a problem of weak motivation and resource misallocation internal to the firm. Liebenstein points to the vast efficiency gains that plants and firms have achieved by "simple reorganizations of the production process such as plant layout reorganization, materials handling waste controls, work methods, and payments by results."[6] Viewed more broadly, X-inefficiency could reasonably include all forms of pure resource waste: excessive advertising, superfluous packaging, redundant plant capacity and so on. In the area of health, it could be all of those plus any other losses due to marketing or promotional activities that are purely cosmetic rather than informational.

---

[5] Harvey Leibenstein, "Competition and X-Efficiency, Journal of Political Economy (May 1973), p. 766.

How does this dimension of performance relate to competition? We have already answered the question as it pertains to advertising and nonprice competition generally. As regards other forms of waste, theory postulates on at least two grounds that costs are lower whenever firms face intense competition:

> In the first place, the process of competition tends to eliminate high-cost producers, while the existence of substantial market power often allows such firms to remain in business. . . . Second, the process of competition, by mounting pressures on firm profits, tends to discipline managements and employees to utilize their inputs, and put forth more energetically and more effectively than is the case where this pressure is absent.[7]

In other words, the "carrot" of greater profits may dangle before all providers seeking to minimize cost, but only the "stick" swung by competition forces providers to pursue that objective.

---

[6] Harvey Leibenstein, Beyond Economic Man (Cambridge, Mass.: Harvard University Press, 1976), p. 37.

[7] W. S. Comanor and H. Leibenstein, "Allocative Efficiency, X-Efficiency and the Measurement of Welfare Losses," Economica (August 1969), p. 304.

5.3.4 Inflation Effect

The third element is called the *inflation effect*. The major concern is that if competition were to be reduced systematically, then prices would increase. Few macro economists would ascribe much power to changing levels of competition in explaining fluctuations in the aggregate levels of prices. However, at micro levels it makes sense. We found that competitive forces are tending to reduce price inflation in both the hospital and the physician service markets. But this competition, brought about by the increased numbers of physicians, has far from eliminated price increases. Not only are prices forecast to increase, but they are forecast to increase at a faster rate than the general level of inflation. All of the behaviors we discussed previously lead, in part, to this performance result. In turn, the change in price trends are likely to influence competitive behavior as well. It is those feedback or symbiotic effects that we captured in our simultaneous equation model.

5.3.5 Technological Progress and Equity

We hypothesized that *technological progress* would mainly increase the productivity of physicians. This hypothesis was not confirmed by our statistical results. It may be that changes in technology should be incorporated into the hospital sector or the hospital and physician sectors. We performed some secondary experiments and believe that this approach would be promising, but we hesitate to speculate on that point at this time. One reason for this is that if technology is capital using as opposed to labor saving, one would probably have to include a relatively sophisticated capital market sector in the hospital model to achieve reasonable long-term forecasts. That extension would have been considerably beyond the scope of this project. In addition, we would have had to make projections concerning future policy concerning reimbursement for capital and other capital regulatory policies that are still under debate. As it stands, the model contains a variable representing technological change. It has a minor impact in increasing the productivity of physicians.

Equity is actually a part of access, if not the central part, for many public health professional. When they discuss health, their central focus is on equity.

As the health care market becomes more efficient through increased competition, the conflict of concerns between efficiency and equity will certainly intensify. Our work on access did not delve into the issue of equity. That is, whether it is morally just to have people's health care expenditures depend on their economic circumstances. The clash between those who seek increased equity and those who advocate increased efficiency will continue, and intensify if markets become more competitive. This is because, as the private market provides more or better health care services, more will be expected for those outside the market. Concerning access, we will see a general benefit throughout the system.

Our forecast is for better service for a wide range of people from rural residents, to those receiving treatment in VA hospitals, the military or state facilities. This is because our model predicts that competition will make these opportunities appear quite attractive in comparison to their alternatives. However, since equity standards are subjective, one should not consider them to be constant. As performance improves, we expect an increase, rather than decrease in pressures for better access to health.

A.0 TECHNICAL APPENDIX

A.1 Model Specifications

The model developed for this research is an eight equation simultaneous equilibrium model of the health care sector. The eight equations represent the supply of physician services, the supply of hospital services, the demand for private hospital insurance, the demand for private physician insurance, the total expenditure functions for government funded hospital spending and physician services spending and the demand functions for out-of-pocket or direct expenditures for hospital and for physician services. In this model, direct expenditures plus private insurance plus government (Federal, State and Local) are identically equal to total expenditures. We use the simultaneous "system" technique of three-stage least squares to estimate the parameters of the model and to account for the contemporaneous joint correlations among the disturbances of each of the eight structural equations. As is well known, all the identities of the simultaneous system must be eliminated prior to the econometric estimation.

After the system is estimated we compute the equilibrium values for all of the endogenous variable in terms of the exogenous variables. This involves a more complex than usual computational algorithm because we have had some endogenous variables appearing only on the right-hand side and lagged endogenous variables as well. The equilibrium values are computed for the within sample (1953-1981) and forecasted period 1982-1990.

A.2 Discussion of Overall Estimation Results

A.2.0 Demand for Private Physician Insurance

The demand for physican services is based on a human capital model of consumer choice where the firm is agent for the employee. In this formulation, individuals "invest" in health care services (physician services) to maintain or improve their health. They do this to increase their own welfare directly and to increase their own economic productivity. In addition, the family unit makes health care choices based on decision rules that maximize the joint family welfare function. In the alternative, the welfare of the family decision makers includes arguments accounting for the welfare of nondecision makers.

These demands and choice preferences of employees are known to business firms and other employers. Employers, as firms, are assumed to attempt to maximize profits, and other institutions minimize expected costs given output or maximized expected output given cost. This leads employers to, over time, select the health insurance that will yield the highest level of satisfaction to the employees given the firm's profit constraint.

In practice this formulation is much less abstract than presented here. Families have an expected level of health care expenditures based on costs they expect to pay. One part of that demand may have a large random component (injuries for example). Another part would have a smaller random component that would be known with more certainty (treatment for chronic conditions). These two components are combined to form the expected demand for health coverage.

Rational employees understand that physician insurance benefits are simply in-kind wages and they would prefer cash if it would purchase equivalent insurance; then they could then select to be self-insured. However, "health wages" while being a tax deductible expense for the employer are tax free income to the employee. To the extent that group physician coverage results in administrative savings (what some might loosely refer to as economies of scale) the costs of coverage could be lower as well.

From the employer's perspective, a dollar spent on wages is equivalent to a dollar spent on employee exercise facilities or employee health insurance. The goal is to find a compensation package that satisfies the employees and management. If the tax treatment were neutral and treated all expenditures equally, all employees would prefer money wages to in-kind benefits (excluding cases where large-scale purchases would economize on administrative purchasing costs (in-group health insurance). The differential tax treatment of health insurance and benefits is an incentive for employers as well as employees. The firm can pay the employees $100 of physician coverage for $100, but it costs the firm $142.86 to pay the employee $110 in after tax income (assuming a marginal tax rate of 30 percent).

A.2.1 Privately Insured Physician Services

Our research findings were consistent with this formulation. We found that both the current and lagged prices of physician services are negatively related to quantity of insured physician services demanded. The result is consistent with our hypothesis that price and quantity should be inversely related in the demand curve.

We find that hospital services are measured as gross-substitutes in the Hicks-Slutsky decomposition sense (as opposed to Hicks-Allen compensated cross effects). In this equation, an increase in the price index for hospital services causes an increase in the demand for insured physician services. The percentage of private hospital expenditures paid by third parties was not found to be significantly related to physician service demand. This may be due to the relatively large percentage of hospital expenditures that were covered throughout the estimation period. We may not have had sufficient statistical variations in that series to measure any influence it may have. The percentage of private physician expenditures paid by third parties is positively related to physician service demand.

Real income is positively related to the demand for privately insured physician expenditures. We believe this has two consistent interpretations. The first is that physician expenditures are normal goods and have positive, but inelastic demands. This is, of course, consistent with our results. Also, we have modeled the demand as the agency relation between employers and employees in dealing with third payors. In this sense, increases in real output should be directly related to increases in real level of factor inputs. Real health care expenditures are a component of real wages in our model and should be highly correlated with labor inputs. For both of these two reasons our model should yield a positive coefficient for real income.

Total population was not found to be statistically significant at the 0.1 level. Using classical criteria, that would be the end of our story. However, as modern probablists, we must note that the computed test statistic is on the boundary. The variable is apparently behaving as a control variable, holding the impact of secular population and other trends constant.

The marginal tax rate was lagged one year to account for the fact that tax based decisions require additional time to be fully realized in the market. Our hypothesis concerning the impact of income tax was not rejected. The effect is particularly strong since we did not include the increasing levels of state and local taxes as exogenous variables. Had these variables, along with all business taxes, been included we presume the total tax effect would be much greater than our calculations which only include the marginal tax rates on income and social security wages.

Medicare and Medicaid would be expected to have an important impact upon the private insurance market for physician services. We used a binary variable with zero representing the premedicare period in our sample of years between 1953-1965. As expected, it had substantial impact on reducing private insurance expenditures. One effect of government programs was to compete with private insurance coverage. We also included the unemployment rate in the durable goods industry as a proxy for changes in insurance coverage over the business cycle. The logic was that unionization and insurance coverage is large in this industry. Changes in economic activity in this industry could be a good proxy for unionized worker coverage. We hypothesized that higher levels of unemployment would reduce the number of covered families and lead to reduced levels of insured physician expenditures. This was not found to be the case. It may be that our variable was not an appropriate proxy measure of this possible effect. What we may need is average of median man hours lost, average or median days without work, or other measures that would better account for labor force participation rate fluctuations.

Assessing the three-stage least squares regression as a whole, it has a very tight fit to the data. It resembles a conventional demand function in all its important characteristics. The formulation is consistent with all of our hypotheses except unemployment. Looking at this equation, one would conclude that the insured physician service component of the model is well behaved and consistent with an orthodox economic approach to the issues.

Table A.1 PRIVATELY INSURED PHYSICIAN SERVICES

```
DEPENDENT VARIABLE    :PIRLQ
------------------

VARIABLES            COEFFICIENTS      STANDARD ERRORS     T-STATISTICS
---------            ------------      ---------------     ------------
CONSTANT               11338.00          26700.00                .425
* QPRICE               ¯2484.70           1845.80              ¯1.346
* ZPRICE                2790.60            833.91               3.346
PCTZ                    ¯593.34            680.73               ¯.872
PCTQ                    1057.20            466.72               2.265
RLYD                    5443.80           1751.00               3.109
POP                    ¯3584.90           3034.80              ¯1.181
TAX[¯1]                 1097.60            562.65               1.951
DMM                     ¯991.93            161.48              ¯6.143
QPRICE[¯1]             ¯3286.00           1839.40              ¯1.786
DUNEMP                    61.58            145.88                .422

                        ANALYSIS OF VARIANCE
                        --------------------

SOURCE          D. F.    SUM. SQUARES       MEAN SQUARES       F-STATISTIC
------          -----    ------------       ------------       -----------
REGRESSION       10      76747865.62         7674786.56          3974.545
ERROR            17         32826.74            1930.98
TOTAL            27      76780692.36
```

* Indicates an endogenous variable.

+ See end of Appendix for legend of variables.

A.2.2 Private Insured Hospital Services

This equation is constructed to be analogous to the physician services insured equation. The functional form is also semi-logarithmic. That is, the endogenous variables (both current and lagged are in levels) and the exogenous variables are in natural logs (with the exception of the medicare-medicaid variable which is either zero or one). Our approach to the issues are also analogous to those developed for physician services.

One difference between insured hospital expenditures and insured physician expenditures concerns risk and uncertainty. We have a situation where the approach that Frank H. Knight developed is applicable. Probabilistic events are decomposed into two classes. The first class is where calculated individual judgements can be made, called risk, and the second class is for those that cannot, called uncertainty. Physician expenditures are risky and hospital expenditures are uncertain. If this is true, people will be much less likely to self-insure (have no insurance) for highly uncertain situations and the degree of power of classical market approaches will fall because we will not have enough statistical variation of actions at the economic margins. We would expect this component of the model to have the least impressive econometric results. However, the economic theory that provides the foundation for the analysis is not less valid. It is as if we studied the behavior of chauffeurs of Rolls Royce limousines in the hopes of discovering the reactions of motorists to a 20 percent increase in gasoline prices. With this in mind, we look at our parameter estimates.

As we expect, this equation, while having a good fit when viewed in isolation, has the lowest F value in our model. In our view one would expect this result from a model based on our formulation of optimal employee and employer behavior with a large random element in their actual hospital expenditures pattern.

Lagged price has the hypothesized negative coefficient consistent with classical economic theory. Current price is not statistically different from zero. We believe the reimbursement policy of third parties throughout our sample period is responsible for this result. Reimbursement of hospitals is based on the previous periods costs of the hospitals. This is exactly what our model indicates. Our model indicates that consumers act as if they base their decisions on the prices that they will be facing for hospital services in the coming year. Those prices or costs are in fact the previous period's (one year lagged) prices.

As in the hospital insurance equation, we find that physician services are gross substitutes for hospital services in the Hicks-Slutsky sense. This result combined with our results from the first equation yields our first piece of evidence that hospitals and physicians will be rivals for limited health care expenditures under a competitive market structure.

Again, the data indicate that variations in the percentage of private hospital expense paid by third parties is not statistically significant in determining variations in the level of hospital expenditures paid by third parties. One needs to be careful as to what to make of this result. It does not mean that the concentration of hospital expenses paid by insurance has no effect on the demand for hospital insurance itself. Our model does not hypothesize that, and neither would most knowledgeable scholars in the field. What our results show is that over our sample period, yearly increases in that coverage from over 50 percent to over 70 percent did not have a separate identifiable impact on demand. In contrast, as in the physician services equation, we found that percentage of private physician expenditures paid by third parties does stimulate or increase the demand for hospital services. In both of these cases it may be that after the level of coverage reaches a specified level, additional insurance has no identifiable separate influence and that physician insurance is currently below that level. It may also be that physician insurance is highly correlated with hospital insurance and those two separate influences are somewhat confounded. Nevertheless, the results are positive and confirm what many observers have also noted.

Real income is directly related to hospital services expenditures as our model predicts. Our explanation for this result is exactly the same as for physician services -- namely, hospital services are normal goods and have positive income elasticities and that labor services have positive marginal products in the national production function. Health expenditures are wage payments in-kind made by employers as agent for employees. Therefore, increases in real output will, by necessity, require increases in real input and real wages.

Population and the marginal tax rate are not statistically significant in our hospital equation. Population appears to be a control variable as in physician services. However, the marginal tax rate was significant in that equation. Hospital coverage has both expanded by covering more families and intensified by paying a larger share of expenses as the federal marginal tax rate has increased. We had expected these partial effects to combine to show a direct impact of taxes on demand. However, the variation in marginal tax rates did not explain variations in expenditures by third parties for hospital services. We performed no heroic procedures to see if alternative formulations could better focus on how this critical variable influences or does not influence demand. This is, however, a critical research question for future work.

Medicare had the impact of reducing the need for private hospital insurance. In effect, the government program reduces the demand for private hospital insurance by providing a subsidized competitive product which is a better "buy" for people eligible for the program.

In this equation, most of the hypotheses we developed were not rejected by the data. However, we were surprised that the marginal tax rate did not have a larger coefficient and that durable goods unemployment had a positive coefficient. Even with these anomalies, the equation as a whole is a consistent representation of the demand for hospital insured coverage one would expect to result from our model. Its lower F statistic is consistent with our error components theory of the demand for hospital services.

Table A.2 PRIVATELY INSURED HOSPITAL SERVICES

DEPENDENT VARIABLE :PIRLZ

VARIABLES	COEFFICIENTS	STANDARD ERRORS	T-STATISTICS
CONSTANT	¯86693.00	31273.00	¯2.772
* ZPRICE	280.86	3214.00	.127
* QPRICE	5691.90	3045.50	1.869
PCTZ	¯198.31	963.78	¯.206
PCTQ	863.58	637.83	1.354
RLYD	7459.90	2192.90	3.402
POP	3309.20	3608.50	.917
TAX[¯1]	585.13	783.76	.747
DMM	¯2223.30	222.09	¯10.011
ZPRICE[¯1]	¯3022.40	1382.10	¯2.187
DUNEMP	286.15	189.04	1.514

ANALYSIS OF VARIANCE

SOURCE	D. F.	SUM. SQUARES	MEAN SQUARES	F-STATISTIC
REGRESSION	10	44972668.77	4497266.88	453.036
ERROR	17	168758.12	9926.95	
TOTAL	27	45141426.89		

* Indicates an endogenous variable.

+ See end of Appendix for legend of variables.

A.2.3 Supply of Physician Services

In this model we assume there is one physician service supply function for the physician services market. It should be remembered that our model is a national time-series specification where one of our objectives is to obtain long run forecasts. These forecasts are to be used to analyze the impact of the projected increases in the numbers of new physicians. Because of our emphasis in the physician impact, the first response others might take would be to enter that variable into every equation in the model. We suspect others will do that subsequently and develop ad hoc justifications for it. Our approach was to analyze the market using conventional economic and econometric methods. Parameter estimates of the model were obtained by using three-stage least squares estimation procedures. The technique is well known by almost all econometricians, however, it is not often used in applied work. This is because it is complex computationally and places great demands upon the researcher's ability to model the economic behavior that is occurring in the market.

We used the same functional form for the supply equation as we did for all the other equations. The exogenous variables are in natural logarithms and the endogenous variables, both current and lagged values, are in levels.

This semi-log form was selected because it provides some additional capability in capturing possible nonlinearities.

We included both current and lagged prices to account for the distributed lag impact of physician prices that we hypothesized. Physicians, like other health care providers, receive payments that are a combination of current and historical prices and costs. The administrative mechanics of this process are well known to reimbursement specialists and there is no need to detail them here. However, we note that physicians (and to a greater extent as we shall see in the case of hospitals) are both purchasers as well as sellers of health care services. The lagged price response in our theory accounts for cost based reimbursement and the fact that customary, usual and reasonable prices are established on a lagged or historical basis. The positive coefficient we obtained is consistent with our model that predicts a positive first derivative of output with respect to price. The negative coefficient represents current costs of operation. Given the assumptions of our model, it would predict that higher levels of costs would reduce supply. This is true even under conditions where those costs, or a portion of them, could be expected to be "passed on" to future patients in future periods. Our model was not rejected in this regard. Current physician costs are producing the results hypothesized in our model.

Another cost based element was included and that is a binary variable representing the period of price controls. Our model had predicted that price controls would have a significant impact in reducing the quantity of physician services supplied at lower than equilibrium market prices. Our results seem to indicate that the economic stabilization program did not have a statistically significant impact on the supply of physician services.

Medical technology was considered to have its major impact in increasing the marginal productivity of physicians. However, we did not have an adequate measure of technical advancement in medicine so we adopted a logarithmic trend. Our assumption was that technological progress was advancing at an increasing or compound rate. If this is true, our model did not detect it. It may be that the technology proxy was inadequate or we over estimated the impact upon physician productivity. It may also be the case that capital using technology is bundled into hospital services because of the reimbursement methods used by third parties.

New nurse graduates lagged one year are incorporated into the model as a measure of health care personnel costs facing physicians. In our model, physician prices are endogenous and in a fully articulated model of the health sector we would specify the employment and wage levels of these employers as endogenous variables. The model would attempt to explain their employment and wage levels in terms of other exogenous factors. The time-series forecasting project developed a separate forecasting capability for new nurse graduates. We used these forecast results as inputs to our estimation. The influence we were particularly interested in measuring was the impact of new entrants into the employment pool. Researchers connected with the time-series modeling project hypothesized that use of the nurse graduate variable could be considered as an instrumental variable for wage rates.

If these interpretations are valid, our results confirm the theoretical development. The theory is essentially an extension of the reduced form cost function first developed by Nerlov and later expanded by Shepherd and Uzawa under the general name of cost function-production duality theory. In our physician supply schedule we find that labor costs or wage rates, via factor supply, have a significant impact on supply. From the cost side we have the following impact. Increases in nurses reduce wages and those lower costs expand the supply of physician services.

The stock of physicians is, of course, considered to be of special significance to this project. Physicians, as economic agents, are modeled as if they are individual firms. Our model abstracts from the growing tendency of physicians to be salaried employees. However, that employment consideration is not seen as a fundamental defect in our model and our model can easily be extended to include this trend. It should also be noted that we would reach the same equilibrium conditions in physician or hospital markets if we approached the problem through the factor market as opposed to the product market as we have in this model.

Our data on physician stock is based on the time-series forecasting project's econometric model. The data and model has been discussed elsewhere.[1] It is essentially a distributed lag partial adjustment model where the new graduates are projected, the existing physicians are aged and age specific mortality rates are applied for each group. The model is estimated using seemingly unrelated regression and the forecasts are made on the basis of the Hildreth-Lu technique. We recognized that in a general equilibrium model the number of students, graduates and practicing or active physicians would all be endogenous variables. Our use of this particular data set was based on the long run objective of having the physician education, employment and utilization manpower market as an endogenous component of the model.

---

[1] Historical and Estimated Data for the U.S. Health Sector 1949-1976, USDHHS, Health Resources Administration, (HRA-81-1), 1981 and Rodgers, J., "Long-Run Forecasts of Prices and Expenditures for Physician and Hospital Services", Profile of Medical Practice, 1981, ed., by D. L. Goldfarb, Chicago: American Medical Association, 1981.

The results are clear. More physicans increase the supply of physician services. With a downward sloping demand schedule, current physician prices would fall and real current physician services would expand. We relax our *Ceteris Paribus* assumptions and adopt the *Mutatis Mutandis* where other things are allowed to vary as they will. The general result is that as demand is expanded in the private and governmental sectors, the long run supply price increases as we would find in an increasing cost industry.

Viewed in its entirety the equation has a very good fit to the data. Because of the complexity of the physician services market, we were pleased to find a strong overall fit. In particular we were pleased to find a significant result for the physician supply variable and that our results were consistent with our theoretical model.

Table A.3 SUPPLY OF PHYSICIAN SERVICES

```
DEPENDENT VARIABLE   :RLQ
------------------

VARIABLES              COEFFICIENTS      STANDARD ERRORS      T-STATISTICS
---------              ------------      ---------------      ------------

CONSTANT                ¯160830.00           19448.00             ¯3.270
* QPRICE                 ¯11422.00            5775.10             ¯1.978
T                          4745.40           10311.00               .460
PHYS                      10116.00            4258.10              2.376
NGRADLAG                   2680.90             727.43              3.685
ESP                        ¯143.88             317.56              ¯.453
QPRICE[¯1]                 6167.80            6014.60              1.026

                         ANALYSIS OF VARIANCE
                         --------------------

SOURCE        D. F.    SUM. SQUARES        MEAN SQUARES          F-STATISTIC
------        -----    ------------        ------------          -----------

REGRESSION      6      379162835.20        63193805.86            16871.658
ERROR          21          78656.76            3745.56
TOTAL          27      379241491.90
```

* Indicates an endogenous variable.

+ See end of Appendix for legend of variables.

A.2.4 Supply of Hospital Services

The general formulation of our model of hospital services supply parallels that of physician services supply. In our aggregate time-series design we abstracted from the institutional level (the hospital itself) to the market (hospital beds). Our model specifies that on the national level it is more appropriate to focus on changes in the supply or availability of beds rather than changes in the number of hospitals. The essential behavior we are attempting to model is the competition in the hospital sector. Hospitals as organizational units rarely "fail" as compared to firms in other competitive industries. The "competition" in the hospital sector may be much more akin to that found in "imperfect competition" or oligopoly models rather than pure competition. That competition is almost certainly to be at the SMSA or county level. Our model would be formulated as a pooled time-series cross-section model. This is one of the future objectives for the model. We choose to formulate our model using only time-series data. Then after all of the time-series results were known, researchers could more effectively extend these findings to cross-section data sets.

Long-term beds are utilized in the hospital equation as a control variable. In the model we assume that the "product" of the hospital has been constant throughout our sample period. However, we suspect that the quality of the product has changed and new services or components of the services have changed. Our objective is to hold those quality variations and service components constant. To accomplish this we introduced the stock of long-term beds as a control for the changing mix of services. Certainly this variable is an imperfect substitute for a detailed analysis of the changes in the intensity of hospital services. However, we also know that the omission of this important aspect would be inappropriate. We suspect that this variable may only be holding some factors constant. These may be related to the changing hospital census of disease related occupancy rates (i.e. poliomialitus or tuberculosis). Other factors may not be correlated with these changes. However imperfect our control variable may be, it seems to be a significant factor in our estimated equation.

The stock of short-term beds serves a different function in our hospital model than long-term beds. Short-term beds are not a control variable for product mix or service intensity. The stock of short-term beds serves an analogous function in the hospital subsector, as the stock of physicians serves in the physician subsector. In the case of short-term beds, we find the same result as hypothesized in our physician model. Additional beds are positively correlated with output in the industry. Hospitals, as firms, respond to net revenue possibilities by expanding production. In a very rough sense hospital beds can be thought of as production facilities like a pay telephone or a fast food outlet. Noneconomists may view these facilities as creating their own demand for the product or services. What they do not see are the foregone sales (reduction in demand) in the competitive markets. To be sure, some calls are simply not made or meals are skipped if a seller is not in the area. But generally it is demand and not supply that drives the system. It seems strange to some that there are "too many" telephones in the airport and "not enough" in the country. Economists are familiar with the apparent contradictions. The current popular literature in the health field contains numerous examples of health professionals being confused by these apparent contradictions.

Short-term beds are a significant factor in determining the output of hospital services. An increase in the number of short-term beds increases the supply of hospital services. As we discuss in the chapter on simultaneity of the model, increases in the supply of hospital services have an inverse impact on the demand for physician services. This is consistent with our formulation of competition between hospital and physician services.

As mentioned earlier, lagged price is behaving as an orthodox price variable in a conventional supply equation. Because of cost based reimbursement and its necessary time lags, lagged price is the most appropriate variable to use as the representation of own price. Current price is used to represent cost of production. Even though with cost based reimbursement cost increases can be passed on to consumers, costs have their hypothesized impact in the current period. The optimizing behavior of hospitals leads them to make rational allocation decisions. In this way an increase in cost results in a decrease in supply. This result is, of course, consistent with our hypotheses on rational cost behavior of organizations in the health industry. Our selection of current price in both the hospital and physician equations seems to be an adequate proxy for costs or is sufficiently correlated with them to satisfy the needs of the model.

Another hypothesized cost factor is wage level of nursing personnel. We expected it to have a separately distinguishable influence on cost. The argument was similar to that for physician services, but in the hospital equation this variable would be expected to have more significance. The model is straight forward. Other things equal, a relative increase in nurse graduates lowers nurse wages, and lower wages lowers costs (or increases output).

This hypothesis was not rejected for physician services supply, but was rejected for hospital services supply. One possible explanation is that our nurse graduate variable is not a satisfactory instrument for current labor costs. A more direct conclusion is that our cost variable is capturing the labor cost component as well as the whole array of other hospital and related costs it was designed to measure. This, of course, does no harm except in the sense that we are unable to separate these individual cost elements. In the case of physician costs, the two elements were separable, but our cost variable in the hospital equation has swamped the effect the nurse graduate variable would have had.

The economic stabilization program had a significant impact in reducing the quantity of hospital services supplied. That is, if the economic stabilization control program held the prices below the equilibrium level, quantity supplied would be less than quantity demanded. This excess demand disequilibrium would result in a shortage of hospital services. In our equilibrium model the effect of price controls would be observationally equivalent to a reduction in supply holding prices constant. This result is obtained because, at the new price controlled level, our shifted supply schedule is to the left of where it would be to produce an equilibrium price equalling the controlled price. This is the orthodox result of a competitive multi-equation model. A disequilibrium model would introduce an additional constraint on prices wherein supply did not equal demand in the control period. In this case we would have a movement along the supply schedule, but not a shift in the supply schedule as in our model. Both formulations are correct and yield equivalent results.

Overall, the hospital supply equation behaves as our model would predict. The estimated values are consistent with our production function and optimizing behavior. The only surprising result was that our overall or general cost index seemed to overpower any separate impact the nurse supply variable may have had.

Viewing the two supply schedules at the same time, we see a pattern of regularity emerging. Lagged prices are behaving as would be expected. This is because of the lagged cost based reimbursement. The effect of this is much stronger in the hospital subsector than in physician subsector as expected. Current costs, as measured by our price index, have the expected inverse relation with supply and tend to confirm our hypotheses concerning optimal behavior of these providers. This overall influence seems to dominate the hospital sector but a statistically significant separate effect for the impact of nurse graduates in the physician subsector was obtained. Our hypothesis concerning a separate impact in the hospital sector was rejected. The economic stabilization or price control period had a separate impact in the case of hospital services but not physician services. This result is consistent with the majority of other studies that focused on this question exclusively. Stock of short-term beds and the stock of physicians have analogous impacts. That is, both can be modeled as variations in the capacity of the industry. In our model, changes in this variable are equivalent to firms expanding branch offices, building new production lines or new firms entering the industry. Changes in technology were not found to significantly increase physician productivity or reduce the costs of physician services in our model. When the two equations are viewed together, these results are consistent and provide additional support for the approach taken to modeling the supply side of the health care sector.

Table A.4 SUPPLY OF HOSPITAL SERVICES

```
DEPENDENT VARIABLE    :RLZ
------------------

VARIABLES              COEFFICIENTS      STANDARD ERRORS       T-STATISTICS
---------              ------------      ---------------       ------------
CONSTANT                ¯164460.00           30192.00               ¯5.447
* ZPRICE                  ¯8387.40            2309.80               ¯3.631
NGRADLAG                  ¯1041.30            1298.20                ¯.802
ESP                        ¯603.05             272.98               ¯2.209
LTBEDS                    ¯5710.90            1419.40               ¯4.023
STBEDS                    20449.00            2704.60                7.561
ZPRICE[¯1]                 3071.90            2124.20                1.446

                              ANALYSIS OF VARIANCE
                              --------------------

SOURCE          D. F.    SUM. SQUARES        MEAN SQUARES         F-STATISTIC
------          -----    ------------        ------------         -----------
REGRESSION        6     275493178.00         45915529.67            2853.485
ERROR            21        337911.70            16091.03
TOTAL            27     275831089.70
```

* Indicates an endogenous variable.

+ See end of Appendix for legend of variables.

A.2.5 Government Expenditures for Hospital Services

The model contains two governmental expenditure equations, one for hospital and the second for physician services. These equations represent the aggregate real expenditures that local, state and federal governments make on hospital services. The largest component of these expenditures is Medicare followed by Medicaid and then a whole array of other social service programs. In our formulation the sum of the governmental expenditure function is aggregated with those of other third party hospital payments and direct payments. They are identically equal to total industry demand.[2] To capture possible simultaneity between private third party payers and government third party institutions, we specified the model in terms of total third party payments (government plus private insurance). Government expenditures are a function of the right hand side variables including, as a separate variable, private insurance hospital services demand. This is, by now, a well known method to include the simultaneity between the demands within an industry. Using this technique, one expects the estimated coefficient of the right hand side variable to be within the confidence interval of unity. This is precisely the estimate we obtained. That is, the confidence interval around our estimated coefficient contains the hypothesized parameter of one.

---

[2] We have omitted the "other" category of hospital expenditures that amount to approximately 1.4 percent of hospital expenditures in our sample period.

Real income was included to investigate the macro economic impact of economic activity on the government spending for hospital insurance. Our initial hypothesis was that as a social program, we would expect a strong but inverse relation between economic activity. In effect, the government program would be acting as a "built in stabilizer" to the hospital services industry. After the model was formulated, but prior to its estimation, we discovered a second possibility. That possibility is that increased economic activity may have an inverse impact on need or demand for some public programs, increased prosperity also may provide more tax revenues and thus stimulate more expenditures over time. One should understand that we have not attempted to develop a political economy or public choice model of the health care sector.[3] This variable was introduced to account for the purely economic influence of aggregate economic activity on governmental hospital service expenditures. Our finding is that real income had no statistically significant independent impact on governmental expenditures. One explanation seems to dominate the possible alternatives. The major program element is Medicare and year-to-year fluctuations in economic activity may have little impact on entry into the eligible population after the actual over 65 population effect is held constant. In effect, the additional expenditures from the need based programs is small relative to the continuing demands by the covered population. Further disaggregation of the model could shed light on the question.

---

[3] However, our research does indicate a market based inquiry into this research area is promising.

Population 65 years and older is a critically important factor in determining total public expenditures on hospital services. We also included the general population to account for the general pool of possible government health assistance program recipients and to obtain a better focus on the pure over 65 effect. We had considered using the under 65 population as opposed to the total population. All three of these series are highly correlated and we chose to gain the possible benefits of having data more closely aligned with our economic model at the cost of obtaining less precise statistical measures of other variables. Alternative formulations can certainly be made, however, we suspect little fundamental differentiation will be obtained. Nevertheless, it may be that our population variable is not, in fact, representing a control variable for population. Rather it could be representing a long-term trend in reducing restrictions on obtaining covered hospital services. If these rule changes are highly correlated with the general growth in population, our population variable may be representing this influence. Because of time and resource constraints we were not able to pursue this issue. We believe it is possible to develop a measure or a proxy measure of the stringency of the administrative rules for both Medicare and Medicaid programs. These two variables would be excellent candidates for inclusion into the model after the theory is expanded to explain their direct and indirect impacts throughout the model.

Lagged price is used in the government expenditure equation because the reimbursement policy that existed throughout our sample period was based on retrospective costs. Unit prices paid by these programs were actually average costs for the previous period. In this way current expenditures were a combination of current utilization and lagged cost. In our model we hypothesized that two competing forces were at work in the hospital sector. The first force is demand related on the part of governmental program managers. One of their objectives was to minimize the cost of the program while maintaining quality and other service standards. From this assumption it is possible to show that at the agency level an inverse relation between prices and output would result, given our knowledge of hospital production functions. At the same time we know the programs are essentially cost based retrospective entitlement programs. These programs have few policy instruments other than to accept cost based price escalation. The net effect of these two forces in our model is indeterminate at least a priori. Our quantitative results indicate the two forces seem to counteract each other with price, neither being a rationing device for further program expansion, nor being the prime culprit as a separate identifiable source in the expansion of real health care expenditures by all governmental sources.

Unemployment, or variations in unemployment rates were not found to be significantly related to variations in the government's real hospital care expenditures. We expected to find that increased unemployment would stimulate the expenditures for government programs. It may be that changes in the levels of unemployment did not effectuate substantial changes in the unemployed labor force. We selected the durable goods sector to specifically account for workers who would have a higher probability of being covered by insurance and then lose their benefits after substantial periods of unemployment. In retrospect, it may be that these employees are well paid and have considerable personal assets with which to purchase private hospital insurance or to have sufficient assets as to be ineligible for program support. This is one explanation for the positive coefficient in the private insurance equation. It may be the case that recently unemployed people opt for elective or other hospital procedures during their unemployment period where they would not lose wages or exhaust sick leave.

The introduction of Medicare and Medicaid appear to be strong influences in increasing governmental expenditures for hospital services. It should be noted that a considerable proportion of these expenditures shifted from the state to the federal government. Also, we did not investigate the extent to which the program increased total hospital expenditures -- if at all. The effects we found were a substantial shift from the private insured and private direct payments to the public sector.

As a whole, the government hospital services equation has a tight statistical fit to the data. We hypothesized a one equation industry supply of hospital services model and we found evidence confirming that hypothesis. However, the significance of the population variable may mean that patients and providers of services to Medicaid clients form a separate identifiable market. By disaggregating Medicare versus Medicaid and all other state programs, a better representation of the expenditures model might be obtained. We would also like to see an independent measure of the liberalization of eligibility rules, expansion of benefits and other program specific measures of administrative control. With those provisos said, it is still striking that the governmental expenditure program is consistent with our model. Given research and program constraints, the program appears to be well represented by our formulation.

Table A.5 GOVERNMENT EXPENDITURES FOR HOSPITAL SERVICES

```
DEPENDENT VARIABLE   :TPRLZ
------------------

VARIABLES              COEFFICIENTS      STANDARD ERRORS      T-STATISTICS
---------              ------------      ---------------      ------------
CONSTANT                 268560.00           51931.00               5.172
RLYD                       1215.90            3275.20                .371
POP                      ¯47767.00            6770.80              ¯7.055
POP65                     31834.00            3779.90               8.422
* PIRLZ                        .98                .23               4.265
ZPRICE[¯1]                 ¯520.97            1007.10              ¯.517
DUNEMP                       97.30             205.77                .473
DMM                         3328.30             539.51               6.169

                        ANALYSIS OF VARIANCE
                        --------------------

SOURCE         D. F.   SUM. SQUARES        MEAN SQUARES        F-STATISTIC
------         -----   ------------        ------------        -----------
REGRESSION       7     349307548.60        49901078.37            3918.269
ERROR           20        254709.79           12735.49
TOTAL           27     349562258.40
```

* Indicates an endogenous variable.

+ See end of Appendix for legend of variables.

A.2.6 Government Expenditures for Physician Services

This equation is based on the same principles as developed for the hospital expenditures model. The institutional arrangements are similar from an economic perspective but different administratively. Our hypotheses would all yield the same signs for the parameters and effects of the control variables.

The government programs in this area seem to be countercyclical in the sense that governmental expenditures for physician services are inversely related to real income. However, unemployment was not found to be significantly related to governmental expenditures for these services. It would be tempting to interpret the coefficient as if this were an agent's demand for a representative consumer. In this case, the real income variable would have a parsimonious interpretation. Namely that lower income individuals are more likely to receive governmentally funded physician services. While this is probably true, our model is not developed on this basis and our data are unlikely to disclose this result. Our data are from a national time-series of all government (federal, state and local) and does not contain household or panel data.

The population 65 years of age and older is significant, and along with our binary variable for the Medicare program confirms our hypothesis concerning the impact of these programs. The population variables and Medicare variable have the same signs and relative magnitudes as in the hospital services equation. The Medicare components have a direct and significant impact on governmental expenditures on hospital services. The program itself and the growing number of participants have significant influences increasing real expenditures.

Our control variable is statistically significant and has the predicted sign. In addition, its magnitude is relatively large. Our hypothesis says that unity should be in the 95 percent confidence region, in this case it is the 98 percent level. In effect, this variable is excessively significant and explains too much of the variation. Of course, this is not a fatal flaw in the model and these circumstances are rarely discussed in applied econometrics. However, considerable care has been taken in this research and we believe these minor points are important to high quality research. In this case we believe we may have omitted one or more relevant explanatory variables or should have allowed for more nonlinearity than was possible with our semi-log specification.

We also found that the two counteracting forces of demand based budget restraint and cost based price escalation were offsetting. However, the tendency in this equation was for the cost based impact to dominate although that domination is weak. Our results indicate that a separate net influence of budget constraint or cost based escalation was not identified in either hospital or physician service public expenditures.

The equation, as a whole, is consistent with the basic model we formulated for the governmental health care sector. It has a relatively tight fit with the data.

Table A.6 GOVERNMENT EXPENDITURES FOR PHYSICIAN SERVICES

```
DEPENDENT VARIABLE   :TPRLQ
------------------

VARIABLES            COEFFICIENTS      STANDARD ERRORS      T-STATISTICS
---------            ------------      ---------------      ------------

CONSTANT                 83836.00           39724.00               2.111
RLYD                     ¯5295.90            2395.30              ¯2.211
POP                     ¯16429.00            6005.30              ¯2.736
POP65                    14875.00            3202.40               4.645
* PIRLQ                      1.56                .23               6.874
QPRICE[¯1]                2066.60            1832.70               1.128
DUNEMP                    ¯130.59             162.91               ¯.802
DMM                       1956.10             266.19               7.349

                         ANALYSIS OF VARIANCE
                         --------------------

SOURCE          D. F.   SUM. SQUARES        MEAN SQUARES        F-STATISTIC
------          -----   ------------        ------------        -----------

REGRESSION        7    282845993.00         40406570.43            1886.547
ERROR            20       428365.44           21418.27
TOTAL            27    283274358.50
```

* Indicates an endogenous variable.

+ See end of Appendix for legend of variables.

A.2.7 Direct Physician Payments

Our model disaggregates total real expenditures on physician services into three components -- private insurance, government expenditures and direct payments. This third division is composed of out-of-pocket expenses from patients without insurance, payments of insured patients for noncovered services, co-pay and deductible payments. Data are not available to adequately decompose the time-series on direct payments into its component parts. This creates similar issues as in the econometric estimation of two-part tariffs as in international trade and other issues related to declining block rates as public utility economics. Our approach is to abstract from those issues because we believe the out-of-pocket or direct expense decisions are based on the utility maximization principle. Our model postulates that individuals act as if they made rational decisions at the margin on the consumption of health insurance, based on the expected prices they face for both insurance coverage and direct payments. As agents for the employees the employers choose profit maximizing or cost minimizing insurance programs as part of their wage determination process (factor market equilibrium).

The simultaneity of these decisions is specifically modeled. One element of the simultaneity is via the price mechanism. It is clear that prices are endogenous variables in all equations. Additional simultaneity is introduced through the control variable (TPRLQ) which represents total third party physician payments. Note that direct payments in our model are identically equal to total physician expenditures less total third party payments. However, third party payments are jointly determined by the combination of government expenditures and private third party physician services payments.[4]

The model we developed would predict that the control variable for third party payments would be statistically significant and not be different from unity. That was precisely what our computed results indicate with the coefficient estimates equalling 1.043. We view that result as particularly important since in some applied research much less precise estimates are considered to be confirmation of the appropriateness of the specification.

The price variables, both current and lagged, were included as in the private insurance equation. In that equation their interpretation as demand parameters was straight forward. However, in this case current price is not significant and lagged price has a positive coefficient. Our interpretation is direct. The insurance copay and deductible effects are overpowering any demand function effects we would observe from those who do not have health insurance. Prices of physician services have the expected and conventional negative sign in the private insurance or agency demand function. Prices have the orthodox rationing function in that submarket. In the direct or out-of-pocket market supply or cost, inflation overpowers any rationing effect of prices. The new result is that higher prices are passed on or shifted to uninsured adding to costs rather than being a mitigating force reducing the real level consumption. Another parallel influence is that higher physician prices may increase total expenditures via higher co-pay and deductible expenses. The basic idea is that co-pay and deductibles for physician services are generally higher than for hospital services. In this way an increase in the physician price index might be expected to have a greater out-of-pocket expenditure effect than would be the case for hospital insurance.

---

[4] As a minor technical point, recall that the three-stage least squares estimation procedure requires that all identities be removed prior to performing the actual estimation.

The standard economic market analysis applies to the insurance equation where the major portion of expenditures and economic planning for both individuals takes place. Higher prices act as a rationing device as in all markets. Our nonnegative price impact has a positive "spill-over effect" as if noninsured expenses are substitutes for insured expenses. In our model we do not have separate prices or shadow prices for covered and direct payments because our model is formulated on a rational planning hypothesis. This is an ex ante or prospective behavior model rather than an ex post or retrospective behavior model. In the former model, expectations play the major role, in the latter model realizations would be the major determinants.

A most interesting confirmation of our market hypothesis concerns hospital prices. In the insured demand function hospital services were found to be substitutes. Certainly one familiar with portfolio theory or other planning models would assume that alternative health services would be gross substitutes in planning and probably in consumption, even though they are joint inputs in a larger sense to a societal health production function. In any event, our model was not based on this or other highly abstract concepts. Our assumptions and derivation are all obtained from standard micro economic market analysis. In the direct expense model one derivative result is that for actual expenditures, physician and hospital expenses would be gross compliments for hospitalized patients and either gross substitutes or complements for patients consuming physician services. Because we did not have family panel data but rather time-series data, this was the most information our model would yield. In our estimated equation the computed sign is negative, but since the level of significance is below acceptable levels we cannot conclude that the two services are complements. When we next look at direct hospital expenses we will find our strong expectations concerning complementarity of out-of-pocket expenses for hospital services and physician services to be confirmed.

As in our insured physician services equation, percent of private expenditures paid by third parties is not a significant determinant in explaining direct physician expenditures. As in that previous equation, we suspect the year-to-year variation in the percentage of expenditures covered is not adequate, given the high level of hospital insurance, to contribute to the explanation of variations in the level of direct physician expenditures.

Physician insurance does reduce the out-of-pocket or direct expenditures on physician services. In the physician insurance equation the extent to which insurance covers private expenditures was found to be statistically significant and directly related to increased expenditures. In this equation the extent of physician insurance was found to be significant and negatively related to out-of-pocket spending. These results seem to point in the direction of substantiating the joint formulation of our model. Certainly one could obtain symmetric and consistent results with very poor or random specifications. However, the evidence seems to be mounting in support of our approach.

Real income is positively related to direct payments for physician services. It is probably true that our results simply confirm the fact that most health care services are normal goods (have positive income elasticities). One interesting speculation would be concerning the extent to which income increases in self-employed individuals and others were causing individuals to become self-insurers. If they are opting for higher deductibles and other "cafeteria" plans, we could be seeing this as an early impact in our model.

Population increases have stimulated increases in out-of-pocket physician expenditures. At least some may interpret our results as indicating this result. However, when we look at the insured expenditures demand we see no such strong impact. We believe a naive interpretation of this parameter estimate would be inappropriate. Upon reflection (after our model was developed), we speculate that this population variable may be a proxy for minority and other individuals who might tend to be lower income but not low enough to qualify for medically indigent status, another group could be illegal immigrants. A final component would be participants in the underground economy. These patients would all have a propensity to purchase physician services out-of-pocket rather than purchase insurance. Clearly, these questions could be better answered by specific detailed microanalytic studies.

Variations in the unemployment rate in the durable goods industry was rejected as a statistically significant factor in explaining variations in direct expenditures on physician services. We had expected to find a direct relation between out-of-pocket physician expenditures and unemployment rates. However, the uncovered or uninsured component of these expenditures must be relatively small or insensitive compared to the co-payment and deductible proportion.

Medicare and Medicaid were found to be significant in their impact on out-of-pocket doctor payments. The introduction of this binary variable indicates that our parameter estimates are consistent with our formulation. We cannot reject the hypothesis that governmentally funded programs, such as Medicare and Medicaid, reduce payments for service which would otherwise be paid out-of-pocket. Medicare and Medicaid have, in effect, substituted governmental payments for private payments. This is not a surprising empirical finding and is consistent with what one would expect to see in a whole range of government subsidy or assistance programs.

The combined marginal income and social security tax rate was not found to be statistically significant in explaining direct physician services expenditures. Given our positive findings for insured physician services, these two results would have been strong evidence in support of our joint hypotheses. We expected the sign to be negative in this equation indicating that higher tax rates induce both employees and employers to offer increasing levels of "tax free" wage income in the form of health benefits, thus reducing out-of-pocket expenses. This would clearly be the result if, over time, new and previously uninsured employees and their dependents had fixed demands for health care and only switched from direct to insured expenditures. It would also be the effect if the expended coverage increased first dollar coverage reducing deductibles and/or co-payment schedules. What our results tend to reveal is that marginal tax rate increases have caused insured coverage to intensify. In effect, employees are provided physician services at a lower price and this increases utilization of services that would not be purchased directly at current prices. In this way we have marginal tax rates stimulating private insurance expenditures and not decreasing direct expenditures.

The equation as a whole provides a clear explanation of this component of the health care sector. In addition, the direct expenditures equation is consistent with the private insured equation providing further support for an overall appraisal of the model. When this equation is viewed in conjunction with the direct expenses for hospital services, the results are impressive.

Table A.7 DIRECT PHYSICIAN PAYMENTS

```
DEPENDENT VARIABLE   :RLQ
------------------

VARIABLES             COEFFICIENTS       STANDARD ERRORS       T-STATISTICS
---------             ------------       ---------------       ------------

CONSTANT              ¯149090.00            32670.00               ¯4.563
* QPRICE                 325.89              3542.70                 .092
* ZPRICE               ¯1950.80              1935.10               ¯1.008
PCTZ                   ¯1066.50               980.98               ¯1.087
PCTQ                   ¯4115.40               608.64               ¯6.762
* TPRLQ                    1.04                  .21                4.867
RLYD                    4235.70              2361.80                1.793
POP                    11972.00              3759.00                3.185
DUNEMP                   106.03               182.94                 .580
DMM                    ¯1041.20               179.51               ¯5.800
QPRICE[¯1]              3684.80              2678.50                1.376
TAX[¯1]                  ¯99.87              1095.50                ¯.091

                          ANALYSIS OF VARIANCE
                          --------------------

SOURCE          D. F.   SUM. SQUARES         MEAN SQUARES         F-STATISTIC
------          -----   ------------         ------------         -----------

REGRESSION       11     378824408.40         34438582.58            1321.120
ERROR            16        417083.49            26067.72
TOTAL            27     379241491.90
```

* Indicates an endogenous variable.

+ See end of Appendix for legend of variables.

A.2.8 Direct Expenses for Hospital Services

Like physician services, direct hospital expenditures contain the expenditures of uninsured individuals and/or their family members, plus co-payments and deductibles of uninsured patients. The model developed for hospital payments is functionally equivalent to the one for direct physician expenditures.

Both current and lagged prices do not have a statistically significant impact on explaining direct hospital expenditures. In the demand for insured hospital services, we found that lagged prices were important in explaining the choice to receive wage income in the form of hospital insurance. After the decision to enroll into an insurance program is made, hospital prices per se do not have a separately identifiable impact on the expenditures for direct hospital expenditures. Our results are consistent with the ex ante anticipations model we developed. The orthodox economic results are obtained in the hospital insurance submodel because direct payments are, in effect, a compliment to insured services.

Because of the composition of the data, this last point needs further clarification. Recall that direct payments are composed of two major classifications of expenditures. The first group contains expenditures by people without insurance. The second group contains expenditures by insured people for co-payments, deductibles and uncovered services. The first component would be considered as substitute payment mechanism in the sense that, for any given total expenditure level, the choice of more insured coverage would mean less direct payment expenses. For insured families, co-payments and deductibles are positively correlated with insured payments up to the various limits set by provisions of the various carriers. Uncovered services include either specific procedures, services or other elements of a hospital which are not considered to be the liability of the carrier and are, in effect, charged back to the patient. If these items are bundled with covered services, the results would be similar to co-pay and deductible payments, if they net out as excluded procedures, they would be identical to uncovered services. The result would depend upon the relative proportions of these groups in our data. Our results seem to imply that these two forces counteract each separate effect. In the physician services equation, the co-pay/deductible complement effect dominated. In this, the hospital services equation, we have a weak relation in this same direction.

As in the physician services equation we find the cooperating service (hospital services there, physician services here) to be compliments. In the demand relation a negative value for the cross price term defines gross compliments in the Hicks-Slutsky sense. That is, $\partial X_i/\partial P_j > 0$ for substitutes and for compliments $\partial X_i/\partial P_j < 0$. This is the standard result. Disaggregating a good or service as we have, would result in the own price term ($\partial Z_i/\partial P_i$) being positive for net compliments and negative for net substitutes. In our example, X_i represents the real expenditures on uninsured hospital services and Z_i represents direct expenditures on hospital services. It is not surprising that for hospitalized patients, expenditures on hospital services are positively correlated with expenditures on physician services. That is, of course, one of the implications of our findings given the results from our other equations.

Higher levels of hospital insurance coverage seem to lead to lower out-of-pocket expenditures. More may be at work here than simply the fact that for any given level of expenditures the more that is insured the less must be paid out-of-pocket. Our finding is that, as the hospital services market has become more heavily insured, it becomes less attractive to pay for all people's hospital bills out-of-pocket. While the impact is not seen as stimulating insurance directly, it was found to retard direct payments. People who in other circumstances would be in the hospital may simply forego hospitalization and rely on other treatment and care from family members. This is a separate effect from cost and other influences which may be present.

The proportion of expenditures on physician services that are paid by insurance is not found to be significant in explaining out-of-pocket hospital expenses. Combining these results with the ones from the physician out-of-pocket equation yields an interesting parallel conclusion. Insurance intensity (percentage of private payments insured) does not have strong "cross over" effects. The "cross over" effect would occur if higher levels of hospital insurance stimulated higher levels of expenditures on physician services. "Cross over" insurance effects would occur if higher levels of physician insurance stimulated hospital expenditures. We noted a weak but significant relation between physician insurance intensity and hospital insurance demand. However, our results seem to provide little evidence that higher levels of one form of coverage stimulate significantly higher levels of consumption of the other service.

Real income was not determined to be influential in determining direct expenditures on hospital services. In this case it appears that the relatively high level of coverage in this period dominated the other economic variables. This is also a partial explanation for the lower level response of unemployment. However, in the case of unemployment we believe more economics may be involved. Our almost uniform results with regard to unemployment rates leads us to question its impact in health care markets, except in the case of long, widespread and persistent major recessions.

As in the direct physician services equation, we find population increases, over time, to be a significant influence on increases in out-of-pocket hospital expenditures. This variable may also be correlated with the growth in population groups such as minorities, illegal immigrants or participants in the underground economy. If this is the case, our population variable would be acting as a proxy for these groups of individuals with a high propensity to purchase health care directly rather than purchase it through insurance.

Medicare and Medicaid were found to significantly reduce out-of-pocket expenditures for hospital services. This result is consistent with our other finding in the physician direct payments, physician insured payments and hospital insurance. In all cases these governmental programs were found to systematically shift expenditures from both the private insurance and private direct payment sectors to public or government sector.

The marginal tax rate is a significant factor in reducing out-of-pocket expenditures on hospital care. Increases in the marginal tax rate, given the special tax treatment of health insurance, make out-of-pocket health expenses relatively more costly and insured health services relatively less expensive. This is analogous to a substitution effect, where the relative price of risk adjusted health insurance has fallen. An increase in the marginal tax rate reduces after tax income. This after tax income effect also reduces the demand for goods with positive income elasticities. Our research results are consistent with this finding.

Our control variable, third party insurance payments, is hypothesized to have a parameter value of one. Our estimate is very close as it was in the physician equation as well. Taken in conjunction with the other equations in the system, an overall appraisal of our stochastic specification seems favorable. Other more sophisticated specification error test procedures have been developed that could be applied to our model. Time and resource constraints prevented us from extending the analysis in this direction. Nevertheless, we believe that our results compare favorably with those obtained in other industry level econometric models. Our results are, in addition, a significant extension and expansion of the work done by the office of Data Analysis and Management in the time-series forecasting project. The model and its simulation capabilities have important implications for the health care industry in general, and continuing value to the HRSA division of medicine. Finally, this level of complexity is an absolute necessity if one desires an adequate understanding of the impact of the projected numbers of physicians on physician behavior, cost of care and access to health care.

Table A.8 DIRECT EXPENSES FOR HOSPITAL SERVICES

```
DEPENDENT VARIABLE   :RLZ
------------------

VARIABLES           COEFFICIENTS       STANDARD ERRORS      T-STATISTICS
---------           ------------       ---------------      ------------
CONSTANT              ¯54341.00            23236.00               ¯2.339
* ZPRICE                113.25              1689.20                 .067
* QPRICE               ¯5118.90             2333.80               ¯2.193
PCTZ                   ¯4350.70              727.19               ¯5.983
PCTQ                     ¯92.01              487.01                ¯.189
RLYD                    2198.00             1859.60                1.182
* TPRLZ                    .92                 .07               12.629
POP                     5907.10             2708.80                2.181
DUNEMP                    63.36              138.03                 .459
DMM                    ¯1440.30              164.19               ¯8.772
ZPRICE[¯1]               946.03             1071.30                ¯.883
TAX[¯1]                ¯1188.50              696.08               ¯1.707

                          ANALYSIS OF VARIANCE
                          --------------------

SOURCE          D. F.   SUM. SQUARES         MEAN SQUARES        F-STATISTIC
------          -----   ------------         ------------        -----------
REGRESSION       11     275557177.60         25050652.50            1463.281
ERROR            16        273912.14            17119.51
TOTAL            27     275831089.70
```

* Indicates an endogenous variable.

+ See end of Appendix for legend of variables.

B.0 LIST OF LITERATURE AND DATA

Adlakha, A.L., Hall, T.L., Muller S. "Working Life of Health Professionals," World Health Statistic Quarterly, 1979, 32(2), pp. 138-153.

Aiken, Linda H., Charles E. Lewis, et al. "The Contribution of Specialists to the Delivery of Primary Care: A New Perspective," The New England Journal of Medicine, Vol. 300, No. 24, June 14, 1979, pp. 1363-1370.

American Medical Association. Profile of Medical Practice, 1981, Chicago: American Medical Association, 1981.

American Medical News. "Oversupply of Physicians called Hazard," October 15, 1982.

Anderson, Ronald and LuAnn Aday. "Access to Medical Care in the U.S.: Realized and Potential," Medical Care, Vol. XVI, No. 7, July 1978, pp. 533-546.

Auster, R.D. and Oaxaca, R.L. "Identification of Supplied Induced Demand in the Health Care Sector," Journal of Human Resources, XVI (Summer, 1981), pp. 327-342.

Baldwin, C. Gene. "Preparing for change: Seven positive approaches to increased competition," HFM, December 1982, pp. 80-81.

Beck, L.C., V.J. Kalogredis, G.T. Anders. "How is the Increasing Doctor Supply Affecting Inter-Doctor Arrangements?" Southern Delaware Medical Journal, June 1980, 52(6), pp. 339-40, 345-7.

Berger, Sally. "Marketing won't solve problems," Modern Healthcare, April 1983, pp. 94-95.

Berry, Charles, Philip J. Held, et al. "Canadian Physician's Supply Response to Universal Health Insurance: The First Five Years in Quebec (Preliminary Results)," in Physicians and Financial Incentives, Health Care Financing Conference Proceedings, Jon R. Gabel, et al., eds., Health Care Financing Administration, 1980, pp. 57-61.

Bidese, C.M., and D.G. Danais (eds.) Physician Characteristics and Distribution in the U.S., 1981 Edition Chicago: Survey and Data Resources, American Medical Association, 1982.

Blackwell, J.E. "Recruitment and Production of Black Physicians in the Seventies," Journal of the National Medical Association, June 1981, 73(6), pp. 489-93.

Blizard, P.J. "Some Positive Benefits that Could Arise from an 'Over-supply' of Doctors in Australia," Australian Family Physician, April 1980, 9(4), pp. 265, 268-271.

Bloom, B.S., and O.L. Peterson. "Physician Manpower Expansionism: A Policy Review," Ann Intern Med, February 1979, 90(2), pp. 249-56.

Blumberg, M.S. "Physician Control of Health Care Utilization and Costs," March 9, 1977 (Processed).

Brown, L. Jackson, and Jake Reid. "Are the Manpower Markets for General Practitioners Working? Implications of New Evidence for Geographic Distribution," Public Health Service, Division of Health Professions Analysis, April 1981.

Brown, J.L., and J.T. Reid. "Equilibrium and Disequilibrium in Markets for General Practitioners: New Evidence Concerning Geographic Distribution of Physicians," in Advances in Health Economics and Health Services Research, Vol. 4, ed. R.M. Scheffler and L.F. Rossiter, JAI Press, Inc., Greenwich, Connecticut, 1983.

Bureau of Health Professions, U.S. Department of Health and Human Services. The Health Professions Requirements Model: Structure and Application, DHHS Publication No. (HRA) 81-15.

Bureau of Health Professions, Department of Health and Human Services. Third Report to the President and Congress on the Status of Health Professions Personnel in the United States, DHHS Publication No. (HRA) 82-2, January 1982.

Bureau of Labor Statistics. Occupational Projections and Training Data, 1980 Edition, U.S. Department of Labor, Bulletin 2052, U.S. Government Printing Office, September, 1980.

Burney, Ira, and Jon Gabel. "Reimbursement Patterns Under Medicare and Medicaid," in Physicians and Financial Incentives, Health Care Financing Conference Proceedings, Jon R. Gabel et al., eds., Health Care Financing Administration, 1980, pp. 11-14.

Butter, I., G. Wright, and D. Tasca. "FMG's in Michigan: A Case of Dependence," Inquiry, XV (March, 1978), pp. 45-57.

Calder, J. Bobby. "Competition getting even hotter," in Modern Healthcare, April 1983, pp. 80-81.

Comptroller General of the United States. Report to the Congress: Policies on U.S. Citizens Studying Medicine Abroad Need Review and Reappraisal, (HRD-81-32), Washington, D.C.: U.S. Government Printing Office, 1980.

Connally, N. Thomas. "Congress Influences Number of Physicians," Internist, March 1980, 21(2).

Constantinou S., and G. Hatcher. "The Relationship Between the Supply of Physicians and Surgical Costs," Dimensions in Health Services, January 1979, 56(1), pp. 30-33.

Cromwell, Jerry, Janet B. Mitchell, and Philip Burstein. "Analysis of Changes in the Content of Physician Office Visits," Deliverable Item 3 on DHHS Contract No. 232-81-0039, Descriptive Analysis of NAMCS.

Cypress, Beulah. "Drug Utilization in Office Visits to Primary Care Physicians: National Ambulatory Medical Care Survey, 1980," Vital and Health Statistics of the National Center for Health Statistics, No. 86, October 8, 1962.

Davis, Karen. "Implications of an Expanding Supply of Physicians: Evidence from a Cross-sectional Analysis," Johns Hopkins Medical Journal, 150(2), 2, 82:55-64.

Davis, Karen, and Louise B. Russell. "The Substitution of Hospital Outpatient Care for Inpatient Care," Review of Economics and Statistics, Vol. 54, No. 2, May 1972, pp. 109-120.

Deane, R.T., F.A. Sloan, J.R. Villavicencio, S.C. Wisniewski, and S. Guterman. An Analysis of Determinants of Health Care Utilization. Report on Contract No. HRA 232-78-0138 with the U.S. DHEW. Silver Spring, MD: Applied Management Sciences, 1980.

Ellwood, Paul M. "The Physician Glut Will Force Hospitals to Look Outward," Hospitals, January 16, 1981, pp. 81-85.

Evans, R. "Supplier Induced Demand: Some Empirical Evidence and Implications," in The Economics of Health and Medical Care, M. Perlman, ed. New York: John Wiley, 1974.

Evans, R.G., E.M.A. Parish, and F. Sully. "Medical Productivity, Scale Effects, and Demand Generation," Canadian Journal of Economics, August 1973, 6:376-93.

Felch, C. "A Coming Glut of Doctors?", Internist, March 1980, 21(2), pp. 3-4.

Feldstein, Martin. "The Rising Price of Physicians' Services," Review of Economics and Statistics, 52, May 1970, pp. 121-133.

Feldstein, Paul J. Health Care Economics, 1979.

Feldstein, Paul J. "Research on the Demand for Health Services," Milbank Memorial Fund Quarterly, July 1966, 64:128-65.

Fenderson, Douglas A., John C. Clark, and Gestur B. Davidson. "The Physician Shortage of 1970: What Happened?", Minnesota Medicine, 2, 81:108-113.

Franz, Julie. "Hospitals react with low-frequency response to potential of cable TV," in Modern Healthcare, January 1983.

Freshnock, L.J. and L.E. Jensen. "The Changing Structure of Medical Group Practice in the United States, 1969 to 1980," Journal of the American Medical Association, CCXLV, June 5, 1981, pp. 2173-76.

Fried, Jules M. and Michael J. Rabinowitz. "Antitrust May Pose New Legal Issues for Hospitals," Hospitals, June 1, 1982.

Friedman, E. "Doctor, the Patient Will See You Now," Hospitals, Sept. 16, 1981, 55(18), pp. 117, 119-20, 122.

Fruen, Mary A. and James Cantwell. "Geographic Distribution of Physicians: Past Trends and Future Influences," Inquiry, Vol. 19, Spring 1982, pp. 44-50.

Fuchs, V.R. "The Supply of Surgeons and the Demand for Operations," Journal of Human Resources, XIII (Supplement, 1978), pp. 35-36.

Fuchs, V. R., and M.J. Kramer. Determinants of Expenditures for Physicians' Services in the United States, 1948-68, New York: National Bureau of Economic Research, 1972.

Funkenstein, D.H. Medical Students, Medical Schools, and Society During Five Eras, Cambridge, MA: Ballinger, 1978.

Gabel, Jon. "The Physician Sector: Cost, Access and Quality Concerns," in Physicians and Financial Incentives, Health Care Financing Conference Proceedings, Jon R. Gabel, et al. eds., Health Care Financing Administration, 1980, pp. 1-7.

Gaffney, J.C., and G.L. Glandon (eds.). Profile of Medical Practice, 1979, Chicago: American Medical Association, 1979.

Gelman, Judith. "Competition and Health Planning: An Issues Paper," Division of Industrial Analysis, Bureau of Economics, Federal Trade Commission, April 1982.

Ginzberg, Eli et al. "The Expanding Physician Supply and Health Policy: The Clouded Outlook," Milbank Memorial Fund Quarterly/Health and Society, 59(4), 81:508-541.

Ginzberg, Eli. "The Grand Illusion of Competition in Health Care," in The Journal of the American Medical Association, Vol. 249, No. 14, April 1983.

Goldfarb, David L. ed. Profile of Medical Practice, Center for Health Services Research and Development, AMA, 1981.

Goldsmith, C. Jeff. "Hospitals aim PPOs at own workers," in Modern Healthcare, June 1983.

Goldsmith, C. Jeff. "Competition: How will it affect hospitals?", in HFM, November 1982, pp. 64-74.

Gordon, T.L. "Applications for 1977-78 First-Year Medical School Class," Journal of Medical Education, August 1978, 53:696-698.

Graduate Medical Education National Advisory Committee (GMENAC). Report of the Graduate Medical Education National Advisory Committee to the Secretary, Department of Health and Human Services, 7 Volumes, Washington, DC: U.S. Government Printing Office, 1980.

Graettinger, John S. "A Tracking Study of U.S. Medical School Graduates from the First to the Second Postdoctoral Year," Journal of Medical Education, Vol. 55, August 1980.

Gray, L.C. "The Geographic and Functional Distribution of Black Physicians: Some Research and Policy Implications," American Journal of Public Health, LXVII, June 1977, pp. 519-26.

Greenburg, Daniel S. "The Growing Doctor Glut," Delaware Medical Journal, 53(2), 2'81:107-108.

Greenwald, Howard P., Project Director. "An Analysis of the Content of Specialty Practices and Their Service Capacities," Executive Summary, prepared by Battelle Human Affairs Research Centers, Health and Population Study Center for Department of Health and Human Services, Public Health Service, Office of Graduate Medical Education, DHHS Publication No. (HRA) 81-649, March 1981.

Guzick, D.S., and R.I. Jahiel, "Distribution of Private Practice Offices of Physicians with Specified Characteristics Among Urban Neighborhoods," Medical Care, XIV, June 1976, pp. 469-88.

Hadley, J. "Physician Participation in Medicaid," Washington, DC: The Urban Institute, 1978.

Halper, H. Robert. "Arizona v. Maricopa County, A stern antitrust warning to health care providers," in HPM, October 1982.

Hart, J.T. "Proposals for Assisted Entry to Medical Schools for Health Workers as Mature Students," Lancet, Nov. 16, 1974, 2(7890), pp. 1191-93.

Hay, Joel. "Selectivity Bias in a Simultaneous Logit-OLSQ Model: Physician Specialty Choice and Specialty Income," Yale University and Human Resources Research Center, University of Southern California.

Hayek, F.A. "The Meaning of Competition," in Individualism and Economic Order, University of Chicago Press, 1948.

Hemenway, David. "The Optimal Location of Doctors," New England Journal of Medicine, 306(7), 2'18'82:397-401.

Hendrickson, R.M. "Hard Times Ahead for Physicians?", American Medical News, July 25, 1980, 23(29), pp 1-3.

Hixson, Jesse S. "A Simultaneous Equation Time-Series Model of the Market for Physician Services," in Profile of Medical Practice, Gaffney and Glandon, eds., 1979.

Hixson, Jesse S. "Budget Retrenchment and Health Manpower: Anticipated Effects on Medical, Dental and Nursing School Enrollment," HRA, unpublished.

Hixson, Jesse S., and N. Mocniak. "The Aggregate Supplies and Demand of Physician and Dental Services," in The Target Income Hypothesis and Related Issues in Health Manpower Policy, DHEW Publication No. (HRA) 80-27, Washington, DC: Health Resources Administration, 1980.

Holahan, John, and William Scanlon, et al. "The Effect of Medicare/Medicaid Reimbursement on Physician Behavior: A Summary of Findings," in Physicians and Financial Incentives, Health Care Financing Conference Proceedings, Jon R. Gabel et al., eds., Health Care Financing Administration, 1980, pp. 45-55.

Holden, W.D. "The Impact of GMENAC," Bulletin of the American College of Surgeons, March 1979, 64(3), pp. 9-12.

Holdrich, M.K. U.S. Regional Projections 1981-2000, National Planning Association Report No. 81-R-1, Washington, DC, 1981.

Honey, R.B. "Rhode Island Bids for Fewer Doctors," Patient Care, Sept. 15, 1980, 14(15), pp. 158-9, 163-6.

Hospitals, "HCFA to Test Capitation Pay and HMO Medicaid Contract: Speaker," September 16, 1982.

Hospitals. "Hospital Economic Forecast: New Trend Index Looks Two Years Ahead," October 1, 1982.

House, Donald R. "Theories of Physician Behavior: Demand Creation; Its Alternatives and an Empirical Basis for Selection," draft interim report, Resources Research Corp, for DHEW, Con. #232-79-0101, May 1980.

Hunt, Leon G. "Branching and Switching of Physicians Among Specialties During Graduate Medical Education," Product Research Inc., U.S. DHHS Contract No. (HRA) 232-78-0135.

Internist. "A Coming Glut of Doctors?", March 1980, 21(2).

Jaroslovsky, R. "Too Many Doctors? Medical Schools May Face Cutback," Wall Street Journal, March 15, 1979, 59(105), p. 20.

Johnson, Iris C., and Ramon V. Robertson. "The Role of Medical School in Manpower Planning," Journal of Medical Education, 57, 2'82:125-127.

Journal of Chronic Diseases. "Health Manpower," Vol. 28, 1975, pp. 189-190.

Kehrer, Barbara H., and Frank A. Sloan. "Patterns of Delivery of Primary Medical Care Services in the United States, 1975-1979: Findings from the Physician Capacity Utilization Surveys," Princeton, NJ: Mathematica Policy Research, 1982.

Kessell, R. "The AMA and the Supply of Physicians," Law and Contemporary Problems, Spring 1970, 35:267-283.

Kessel, Reuben. "Price Discrimination in Medicine," Journal of Law and Economics, 1, October 1958, pp. 20-54.

Kimbell, L.J. "Physician Behavior in Scarcity Areas," *A Comparative Economic Analysis of Group Practice and Solo Fee-for-Service Practice*, Final Report on Contract No. (HSM) 110-70-354 with the National Center for Health Services Research and Development, U.S. DHEW. Springfield, VA: National Technical Information Service, 1974.

Kmenta, Jan. *Elements of Econometrics*, New York: The Macmillan Company, 1971.

Koch, Hugo. "Drug Utilization in Office Practice by Age and Sex of the Patient: National Ambulatory Medical Care Survey, 1980," *Vital and Health Statistics of the National Center for Health Statistics*, No. 81, July 26, 1981.

Koch, Hugo. "Drugs Most Frequently Used in Office-Based Practice: National Ambulatory Medical Care Survey, 1980," *Vital and Health Statistics of the National Center for Health Statistics*, No. 78, May 12, 1982.

Korcok, J. "Ontario Medical Manpower Study Shows Plenty of MDs But Shortages in Most Specialties," *Canadian Medical Association Journal*, Jan. 24, 1976, 114(2), pp. 154-6, 161.

Koughman, P. William. "Independents can survive, thrive," in *Modern Healthcare*, April 1983.

Krystynak, Leonard F., ed. *Proceedings of the National Conference on Capital, Credit and Competition: New Strategies in Changing Markets*, U.S. DHHS Con. No. HRA 232-79-0037.

Kuntz, Esther F. "Hospitals forming PPOs to fend off HMO rivals," in *Modern Healthcare*, February 1983.

Kuntz, Esther F. "HMOs run path of consolidation," in *Modern Healthcare*, May 1983.

Kuntz, Esther F. "Round 2: AHSC Jabs at Antitrust Charge," *Modern Healthcare*, September 1982.

Kuntz, Esther F. "Tax-Exempt Bond Issues Hit Peak: Hospitals Bank on Interest Rate Drop," *Modern Healthcare*, February 1982.

Lancaster, C.J., and C.B. Loadholt. "South Carolina Physician Population 1965 Through 1975: A Statistical Study," *Journal of the South Carolina Medical Association*, September 1978, 74(9), pp. 407-13.

Langwell, K.M. "Differences by Sex in Economic Returns Associated with Physician Specialization," Journal of Health Politics, Policy and Law, Winter 1982, 6(4), pp. 752-61.

Langwell, K. Physician Location Choices: Policies to Influence Physicians to Locate in Unreserved Areas, Human Resources Research Center, Los Angeles, California, 1975.

Langwell, K. "The Relationship Between Family Income and Health Expenditures," in Martin, B.C., ed., Socioeconomic Issues of Health, 1977, American Medical Association, Chicago: June 1977.

Langwell, K.M., Joel D. Bobula, Sylvia F. Moore, Barbara B. Adams. An Annotated Bibliography of Research on Competition in the Financing and Delivery of Health Services, U.S. DHHS Publication No. (PHS) 83-3326.

Langwell, Kathryn M., and Sylvia F. Moore. A Synthesis of Research on Competition in the Financing and Delivery of Health Services, U.S. DHHS Publication No. (PHS) 83-3327.

Lawlor, A.C., and Reid, J.T. "Hierarchical Patterns in the Location of Physician Specialists Among Counties, Inquiry, Spring 1981, 18, pp. 79-90.

La Violette, Suzanne. "More states will kindle competition between hospitals, 'czar' warns," in Modern Healthcare, April 1983.

Ledbetter, Robette. "The Market and Medicine: When the Rules Don't Apply," Private Practice, October 1982.

Lee, P.R., L. LeRoy, J. Stalcup, and J. Beck. Primary Care in a Specialized World, Cambridge, MA: Ballinger, 1976.

Lee, Robert H., and Jack Hadley. "Physicians' Fees and Public Medical Care Programs," Health Services Research, Vol. 16, No. 2, Summer 1981, pp. 185-203.

Leffler, K.B., and C.M. Lindsay. "Markets for Medical Care and Medical Education: An Integrated Long-run Structural Approach," Journal of Human Resources, Winter 1981, 16(1), pp. 20-40.

Linder, Joseph Jr. "DRGs spur management-related groups," in Modern Healthcare, May 1983.

Lloyd, S.M., D. G. Johnson, and N.M. Mann. "Survey of Graduates of a Traditionally Black College of Medicine," *Journal of Medical Education*, LIII, August 1978, pp. 640-50.

Louria, D.B. "Coping with the Impending Doctor Glut," *Journal of the Medical Society of New Jersey*, July 1981, 78(7), pp. 503-4.

Luft, H.S. *Health Maintenance Organizations: Dimensions of Performance*, New York: Wiley-Interscience, 1981.

Lukomnik, J.E. "Redistributing Physician Services: Some Ethical Issues," *Progress in Clinical Biological Research*, 1981, *76*, pp. 227-34.

Lyle, C. et al. "Cost of Medical Care in a Practice of Internal Medicine: A Study in a Group of Seven Internists," *Annals of Internal Medicine*, July 1974, 81:1-6.

Mason, Henry R. "Manpower Needs by Specialty," *Journal of the American Medical Association*, 219, March 1972, pp. 1621-26.

May, J.M. "Utilization of Health Services and the Availability of Resources," in R. Andersen et al. (eds.), *Equity in Health Services: Empirical Analysis in Social Policy*, Cambridge, MA: Ballinger, 1975.

McCarthy, E.G., M.L. Finkel, and A.J. Kamons. "Effects of Screening by Consultants on Recommended Elective Surgical Procedures," *New England Journal of Medicine*, December 19, 1974, 291(25):331-35.

McClatchie, G. "The New South Wales Medical Registration Work Force Survey, 1976," *Medical Journal of Australia*, April 22, 1978, 1(8), pp. 456-60.

McLean, Robert A. "The Structure of the Market for Physicians' Services," *Health Services Research*.

McLemore, Thomas, and Hugo Koch. "1980 Summary: National Ambulatory Medical Care Survey," *Vital and Health Statistics of the National Center for Health Statistics*, No. 77, February 22, 1982.

McMenamin, Peter. "Future Research and Policy Directions in Physician Reimbursement," in *Health Care Financing* Review, Vol. 2, No. 4, Spring 1981, pp. 61-75.

McNutt, David R. "GMENAC: Its Manpower Forecasting Framework," *American Journal of Public Health*, 71(10), October 1981, pp. 1116-1124.

Mendenhall, Robert C., Principal Investigator. *Medical Practice in the United States*, Special Report of the Robert Wood Johnson Foundation, 1981.

Mendenhall, R.C., R.A. Girard, and S. Abrahamson. "A National Study of Medical and Surgical Specialites: I. Background, Purpose, and Methodology," *Journal of the American Medical Association*, CCXV, September 1, 1978, pp. 848-852.

Mendenhall, R.C., C.E. Lewis, G.P. DeFlorio, and R.A. Girard. "A National Study of Medical and Surgical Specialties: III. An Empirical Approach to the Classification of Patient Care," *Journal of the American Medical Association*, CCXVI, May 18, 1979, pp. 2180-85.

Mendenhall, R.C., J.S. Lloyd, P.A. Repicky, J.R. Monson, R.A. Girard, and S. Abrahamson. "A National Study of Medical and Surgical Specialties: II. Description of the Survey Instrument," *Journal of the American Medical Association*, CCXV, September 8, 1978, pp. 1160-68.

Mendenhall, R.C., D.L. Ramsay, R.A. Girard, G.P. DeFlorio, P.E. Weary, and J.S. Lloyd. "A Study of the Practice of Dermatology in the United States," *Archives of Dermatology*, CXIV, October 1978, pp. 1456-62.

Mendenhall, R.C., A.R. Tarlov, R.A. Girard, J.K. Michel, and S.E. Radecki. "A National Study of Internal Medicine and Its Specialties: II. Primary Care in Internal Medicine," *Annals of Internal Medicine*, XCI, August 1979, pp. 275-87.

Mendenhall, R.C., C. Watts, S.E. Radecki, and R.A. Girard. "Neurosurgery in the United States: A Log-Diary Study," *Neurosurgery*, VIII, February 1981, pp. 267-76.

Mick, S.S. "Understanding the Persistence of Human Resource Problems in Health," *Milbank Memorial Fund Quarterly*, Fall 1978, 56(4), pp. 463-99.

Milne, R.M. "Medical Manpower: The Next Twenty Years," *British Medical Journal*, October 1978, 2(6146), p. 2132.

Mitchell, J.R. "Medical Manpower: The Joker in the Student Numbers Game," *South African Medical Journal*, November 1978, 54(22), pp. 934-37.

Mitchell, Janet B., and Jerry Cromwell. Physician-Induced Demand for Surgical Operations, Final Report, Grant No. 95-P-97245/2-01, Health Care Financing Administration, Boston: Center for Health Economics Research, December 1980.

Modern Healthcare. "Aim PPOs at businesses, not providers," April 1983.

Modern Healthcare. "DRGs make R.N.s more important--or too costly," May 1983.

Modern Healthcare. "HCFA enforcing strict pay policy," May 1983.

Modern Healthcare. "Sales reps sell hospital services," May 1983.

Mounsey, R.L. "The Dark Side of GMENAC," Bulletin of the American College of Surgeons, April 1981, 66(4), pp. 10-15.

Mueller, Charlotte F., and Johah Otelsberg. "Interim Research Findings on Physician Reimbursement Under Medicare," in Physicians and Financial Incentives, Health Care Financing Proceedings, Jon R. Gabel, et al. eds., Health Care Financing Administration, 1980, pp. 25-33.

Musgrave, Gerald L. "A Policy Review," Women and Health, Vol. 6(3/4), Fall/Winter 1981.

Neuhauser, Duncan. "Comparing the Financial Options," Internist, March 1980, 21(2).

New York State Journal of Medicine. "Geographic Distribution of Health Manpower--Particularly Physicians," October 1978, 78(12), pp. 1864, 1972.

Newhouse, J.P. The Erosion of the Medical Marketplace, or What the Market Hath Joined Together, Let Not Health Insurance Put Asunder, The Rand Corporation, May 1977.

Newhouse, J.P. "A Model of Physician Pricing," The Southern Economic Journal, 37(2), October 1970, pp. 174-183.

Newhouse, J.P., A.P. Williams, W.B. Schwartz, and B.W. Bennett. The Geographic Distribution of Physicians: Is the Conventional Wisdom Correct? Rand Report R-2734-HJK/HHS/RWJ/RC, Santa Monica, 1982.

Newhouse, J.P. "Is competition the answer?", in Journal of Health Economics, 1 (1982), North-Holland Publishing Company, pp. 109-116.

Newhouse, J.P., and M.S. Marquis. "The Norms Hypothesis and the Demand for Medical Care," *Journal of Human Resources*, XIII, 1978, pp. 159-82.

Newhouse, J.P., and C.E. Phelps. "New Estimates of Price and Income Elasticities of Medical Care Services," in R.N. Rosett (Ed.), *The Role of Health Insurance in the Health Services Sector*, New York: Neale Watson Academic Publications, 1976.

Newhouse, J.P., and F. Sloan. "Physician Pricing: Monopolistic or Competitive: Reply," *The Southern Economic Journal*, 38(4), April 1972, pp. 577-580.

Newhouse, J.P., Alpert P. Williams, et al. "Where Have All the Doctors Gone?", *Journal of the American Medical Association*, Vol. 247, No. 17, May 7, 1982, pp. 2392-2406.

Newhouse, J.P., A.P. Williams, B.W. Bennett, and W.B. Schwartz. *How Have Location Patterns of Physicians Affected the Availability of Medical Services?*, R-2872-HJK/HHS/RWJ. Santa Monica, CA: Rand, May 1982.

Newman, Alan S., and Paul F. Lilienkamp. "Virginia Physicians' Response to Changes in Coding Terminology," in *Physicians and Financial Incentives*, Health Care Financing Conference Proceedings, Jon R. Gabel, et al. eds., Health Care Financing Association, 1980, pp. 63-69.

Office of Technology Assessment. Congress of the United States, *Forecasts of Physician Supply and Requirements*, Washington, DC, April 1980.

Parkhouse, J. "Output of Doctors," *British Medical Journal*, 1(6077), June 25, 1977, p. 1665.

Pauly, M.V., and K.M. Langwell. "Research on Competition in the Financing and Delivery of Health Services: Problems and Prospects," in *Research on Competition in the Financing and Delivery of Health Services: Future Research Needs*, Louis F. Rossiter (ed.), DHHS Publication No. (PHS) 82-3228-2, U.S. Department of Health and Human Services, National Center for Health Services Research, 1982.

Perlman, B.B., A.H. Schwartz, J.C. Thornton, R. Weber, K. Schmidt, S. Nagelberg, and M. Paris. "Medicaid-Funded Private Psychiatric Care in New York City: The Role of Foreign-Trained Physicians," *New England Journal of Medicine*, CCIC, August 3, 1978, pp. 230-33.

Petersdorf, R.G. "Health Manpower: Numbers, Distribution, Quality," Annals Internal Medicine, 82(5), May 1975, pp. 694-701.

Prixley, C.C. "Army Medicine Hurt by MD Shortage," US Medicine, 15(2), January 15, 1979, pp. 47-50.

Punch, Linda. "M.D.s, hospitals beat out systems in the alternative service market," Modern Healthcare, May 1983.

Raber, P.E. "Physician Population Alters Product Needs," Medical Production and Sales, 13(2), February 1982, pp. 44-52.

Ranseen, A. Thomas. "A holistic approach recognizing emergency department price components," in HFM, December 1982, pp. 12-29.

Redisch, M., J. Gabel, and M. Blaxall. "Physician Pricing, Costs and Incomes," in Annual Series in Health Economics, Gary A. Steiner, Ed., Greenwich, CT: JAI Press, 1980.

Reinhardt, U.E. "An Economist Assesses Physician Supply and Demand," Patient Care, 14(15), September 15, 1980, pp. 168-81.

Reinhardt, U.E. "Comment on 'Competition Among Physicians'," Competition in the Health Care Sector, ed. by W. Greenberg, Germantown, MD: Aspen Systems, 1978.

Reinhardt, Uwe E. "The GMENAC Forecast: An Alternate View," American Journal of Public Health, 71(10), 10'81: 1149-1157.

Reinhardt, U.E. Physician Productivity and the Demand for Health Manpower, Cambridge, MA: Ballinger, 1975.

Reinhold, Robert. "Majority in Survey on Health Care Are Open to Changes to Cut Costs," New York Times, March 29, 1982.

Relman, A.S. "The Allocation of Medical Resources by Physicians," Journal of Medical Education, 55, 1980, pp. 99-104.

Robinson, L. Michele. "HHS backpedals on physician rules," in Modern Healthcare, January 1983.

Robinson, L. Michele. "HCFA stands by hospital M.D. regs," in Modern Healthcare, April 1983.

Robinson, L. Michele. "Hospital industry, government haggle over particulars of prospective pay," in Modern Healthcare, June 1983, pp. 20-22.

Rodgers, J. "Long-Run Forecasts of Prices and Expenditures for Physician and Hospital Services," Profile of Medical Practice, 1981, ed., by D.L. Goldfarb, Chicago: American Medical Association, 1981.

Rodgers, Jack. "Implications of the Projected Doctor 'Surplus': Summary of Important Findings from Four Recent Studies," DHHS, No. (DHPA) 81-17, March 1981.

Rooney, J.P. "An NHI Alternative," National Underwriters, 83(44), Nov. 3, 1979, pp. 12-19.

Rosinski, Edwin F. "The Physician 'Surplus': How Did It Happen? What to Do About It?", Virginia Medical, 108, 9'81:628-634.

Rossiter, Louis, F., ed. Research on Competition in the Financing and Delivery of Health Services: Future Research Needs, U.S. DHHS Publication No. (PHS) 83-3328-2.

Royal, F.S. "President's Column: Survival of Black Health Care Providers," Journal of the National Medical Association, 73(10), October 1981, pp. 915-916.

Roybal, E.R. "Minorities in Medicine: The Next Decade," Journal of Medical Education, 54(8), August 1979, pp. 652-55.

Sachs, Michael. "Help your physician 'brokers' make profits," in Modern Healthcare, April 1983.

Sanazaro, Paul J. "How Will Quantity Affect Quality?", Internist, 21(2), March 1980.

Scheffler, Richard M. "The Productivity of New Health Practitioners: Physician Assistants and Medex," in Research in Health Economics, Richard M. Scheffler, ed., Greenwich, CT: JAI Press, 1979.

Scheffler, Richard M., Lynn Paringer, Gloria Ruby, and Ruth Lis. "The Effect of Economic Incentives on the Education and Distribution of Physicians: A Review," Health Policy and Education, 1980, pp. 271-289.

Scheffler, R.M., S.G. Yoder, N. Weisfeld, and G. Ruby. "Physicians and New Health Practitioners: Issues for the 1980s," Inquiry, 16(3), Fall 1979, pp. 195-229.

Schonfeld, Kyman K., Jean F. Heston, and Isidore S. Falk. "Numbers of Physicians Required for Primary Medical Care," New England Journal of Medicine, 286, March 1972, pp. 571-76.

Schwartz, H. "Doctors are Treated to a Dose of Competition," Wall Street Journal, August 16, 1982, p. 12.

Schwartz, H. "Physician Surplus: Blessing or Burden? Keeping Up with the Competition," Internist, 21(2), March 1980, pp. 5-6.

Schwartz, W.B., J.P. Newhouse, B.W. Bennett, and A.P. Williams. "The Changing Geographic Distribution of Board-Certified Physicians," New England Journal of Medicine, CCCIII, October 20, 1980, pp. 1032-38.

Simler, S.L. "Medical Graduate Cutbacks Could Spur Resident, Physician Services," Modern Healthcare, 10(11), November 1980, pp. 26-34.

Simler, S.L. "Will payments for capital cost be tied to DRGs?", in Modern Healthcare, March 1983.

Simler, S.L. "Gloomy report rekindling attack on costs," in Modern Healthcare, March 1983.

Sloan, Frank. "Access to Medical Care and the Local Supply of Physicians," Medical Care, Vol. XV, No. 4, April 1977.

Sloan, Frank. "Physicians and Hospitals: Implications of an Expanding Physician Supply," April 1982, publication forthcoming.

Sloan, Frank A., and Judity D. Bentkover. Access to Ambulatory Care and the U.S. Economy, Toronto: Lexington Books, 1979.

Sloan, F.A., and R. Feldman. "Competition Among Physicians," Competition in the Health Care Sector, ed. by W. Greenberg, Germantown, MD: Aspen Systems, 1978.

Sloan, Frank A., and R. Feldman. "Monopolistic Elements in the Market for Physicians' Services," presented at Federal Trade Commission Conference, Competition in the Health Care Sector: Past, Present and Future, Washington, DC, June 1-2, 1977.

Sloan, F.A., and J.H. Lorant. "The Allocation of Physicians' Services: Evidence on Length-of-Visit," Quarterly Review of Economics and Business, XVI, Autumn 1976.

Sloan, F.A., and J.H. Lorant. "The Role of Waiting Time: Evidence from Physicians' Practices," Journal of Business, L, October 1977, pp. 486-507.

Steiber, R.S., and A.J. Boscarino. "Hospital 'shopper' more crucial in today's competitive market," in Modern Healthcare, April 1983.

Steinwachs, Donald M. et al. "Changing Patterns of Graduate Medical Education," New England Journal of Medicine, 306(1), 1'7'82:10-14.

Steinwald, Carolynn. "A Critique of 'Manpower Needs by Specialty'," Journal of the American Medical Association, 222, December 1972, pp. 1411-12.

Stell, L.K. "Stop the Draft: Why Compulsory Redistribution of Physicians Would be Wrong," Programs in Clinical Biological Research, 76, 1981, pp. 213-25.

Stevens, Rosemary. "Trends in Medical Specialization in the United States," Inquiry, March 1971, 8:9-19.

Stoeckle, J.D., and R. Goldstein. "Views from the Clinic: Doctors, Jobs and Money in the U.S.A.," Social Sciences and Medicine, 14(2), March 1980, pp. 89-90.

Studnicki, J., R.M. Saywell, and W. Wiechetek. "Foreign Medical Graduates and Maryland Medicaid," New England Journal of Medicine, CXCIV, May 20, 1978, pp. 1153-57.

Sweeney, G.H. "The Market for Physicians' Services: Theoretical Implications and an Empirical Test of the Target Income Hypothesis," Southern Economic Journal, XLVIII, January 1982, pp. 594-613.

Tarlov, A.R., R.C. Mendenhall, S.E. Radecki, and C.J. Moynihan. The Complexity of Diagnoses and Services Associated with Types of Care in Family Practice, General Internal Medicine and Four Subspecialties of Internal Medicine, Los Angeles: University of Southern California School of Medicine, 1981.

Thompson, J. Martin. "New forms of competition responding to the organizational revolution," in HFM, October 1982.

Tierney, John T. et al. "Controlling Physician Oversupply Through Certificate of Need," American Journal of Law and Medicine, 6(3):335-360.

Tokarz, Wally. "Competition is Likely to Change Practices, Internists are Told," *American Medical News*. October 15, 1982.

U.S. Department of Health, Education and Welfare. *Evaluation of Health Manpower Shortage Area Criteria*, No. (HRA) 80-20.

U.S. Department of Health, Education and Welfare. *An inventory of State Support for Health Manpower Training Programs*, DHEW Publication No. (HRA) 77-100, July 1976.

U.S. Department of Health and Human Services. "Criteria for Designation of Health Manpower Shortage Areas; Final Rule," *Federal Register*, *45*, November 17, 1980, 75996-76010.

U.S. Department of Health and Human Services. *Model for Estimating Physician Supply in 1990*, DHHS Publication No. (HRA) 81-634.

U.S. Department of Health, Education and Welfare. *A Report to the President and Congress: On the Status of Health Professions Personnel in the United States*, DHEW Publication No. (HRA) 79-93, March 1979.

U.S. Department of Health, Education and Welfare. *A Report to the President and Congress: On the Status of Health Professions Personnel in the United States*, DHEW, December 1979, (advance copy).

U.S. Department of Health, Education and Welfare. *A Report to the President and Congress: On the Status of Health Professions Personnel in the United States*, DHEW Publication No. (HRA) 82-2, January 1982.

U.S. Department of Health, Education and Welfare. *The Target Income hypothesis and Related Issues in Health Manpower Policy*, DHEW Publication No. (HRA) 80-27.

U.S. Department of Health and Human Services. *Medicare Program: Schedule of Limits on Hospital Inpatient Operating Costs for Cost Reporting Periods Beginning on or After October 1, 1982*, Health Care Financing Administration, September 30, 1982, pp. 43296-43338.

U.S. Department of Health and Human Services. *1980 National Ambulatory Medical Care Survey*, Public Health Service, Office of Health Research, Statistics, and Technology, National Center for Health Statistics, June 1982.

U.S. Department of Health and Human Services. *The Health Professions Requirements Model: Structure and Application*, DHHS Publication No. (HRA) 81-15.

Wade, C. William, and A. James Burns. "Competition in rural areas consider price and nonprice competitive elements," in *HFM*, December 1982.

Wallace, Cynthia. "FTC, Multihospital Chains Face Off on Antitrust Impact of Acquisitions," *Modern Healthcare*, September 1982.

Wallace, Cynthia. "AMI Bid Edged Rival Out of Market: FTC," *Modern Healthcare*, July 1982.

Wallace, Cynthia. "Prospective payment scheme tallies kudos from Congress and industry," in *Modern Healthcare*, March 1983.

Wallace, Cynthia. "Contracts shift Medi-Cal business," in *Modern Healthcare*, January 1983.

Wallace, Cynthia. "California contracting law sparks PPOs," in *Modern Healthcare*, February 1983.

Wallace, Cynthia. "'Feisty' Heckler now HHS' protector--but she first must learn the issues," in *Modern Healthcare*, February 1983.

Wallace, Cynthia. "Competition forces hospitals to 'humanize'," in *Modern Healthcare*, April 1983.

Way, P.O., L.E. Jensen, and L.J. Goodman. "Foreign Medical Graduates and the Issue of Substantial Disruption of Medical Services," *New England Journal of Medicine*, 299(14), October 5, 1978, pp. 745-51.

Weil, Thoman P. "Do More Physicians Generate More Hospital Utilization?", *Hospitals*, January 1, 1981, pp. 70-74.

Wendling, Wayne R., Jack L. Werner, and Norbut W. Budde. "Health Manpower Programs to Affect Physicians' Location: A Regional Analysis," *Journal of Health, Politics, Policy and Law*, 6(1), April 1981, pp. 120-135.

Wennberg, J.E., and A. Gittleson. "Health Care Delivery in Maine: Patterns of Use of Common Surgical Procedures," *Journal of the Maine Medical Association*, LXVI, May 1975, pp. 123-49.

Wennberg, J., and A. Gittleson. "Small Area Variations in Health Care Delivery," Science, Vol. 182, December 14, 1973, pp. 1102-1108.

Wennberg, J., C. Lapenas et al. Variations in Population-Based Use Rates and Expenditures: Implications for Manpower Policy. Background paper prepared for the GMENAC Geographic Distribution Panel, Hyattsville, MD, 1980.

Wilson, Larry Y., and Robert Pattison. "Strategy Can Close the 'Capital Gap'," Hospitals, June 16, 1982.

Witt, A. John, and L. Nelson McRoberts. "Lack of expertise, funding shackles marketing moves," in Modern Healthcare, April 1983.

Wright, R. Charles. "Cutting usage and costs: How CFOs can conserve energy resources," in HFM, January 1982.

Yett, D.E. "Comment on 'Competition Among Physicians'," Competition in the Health Care Sector, ed. by W. Greenberg, Germantown, MD: Aspen Systems, 1978.

Yett, D.E., W. Der, R.L. Ernst, and J.W. Hay. "A Model of Physician Pricing, Output, and Health Insurance Reimbursement: Findings from a Study of Two Blue Shield Plans," Economics of Health Care, ed. by J. van der Gaag, J. Neenan, and T. Tsukahara, New York: Praeger, 1982.

Zirkle, T.E. "Medicine's Next Decade," Group Practice Journal, 30(3), March 1981, pp. 5-19.

Table B.1 Legend

Endogenous Variables

PIRLQ	Real private insurance expenditures on physician services
PIRLZ	Real private insurance expenditures on hospital services
QPRICE	Price index of physician services
RLQ	Real total expenditures on physician services
RLZ	Real total expenditures on hospital services
TPRLQ	Third party real expenditures on physician services
TPRLZ	Third party real expenditures on hospital services
ZPRICE	Price index of hospital services

Exogenous Variables

DMM	Binary variable for Medicare and Medicaid
DUNEMP	Unemployment rate in durable goods industry
ESP	Binary variable for Economic Stabilization Program
LTBEDS	Number of long term hospital beds
NGRADLAG	Number of graduating nurses lagged one year
PCTQ	Percent of private physician expenditures paid by insurance
PCTZ	Percent of private hospital expenditures paid by insurance
PHYS	Total number of physicians
POP	Total population
POP65	Population over 65 years of age
RLYD	Real disposable personal income
STBEDS	Number of short-term hospital beds
T	Technological change
TAX	Marginal tax rate

[-1] indicates the variable was lagged one period.

Table B.2 DATA

Endogenous Variables

Variable: PIRLQ

Variable Title: Private insurance expenditures on physicians' services

Sources: 1950, 55, 60, 65-81; Health Care Financing Review, Vol. 4, No. 1, September 1982, p. 25, Table 5.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, Historical and Estimated Data for the U.S. Health Sector 1949-1976, p. 38, Table 2.b.

Variable: PIRLZ

Variable Title: Private insurance expenditures on hospital care

Sources: 1950, 55, 60, 65-81; Health Care Financing Review, Vol. 4, No. 1, September 1982, p. 24, Table 5.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, Historical and Estimated Data for the U.S. Health Sector 1949-1976, p. 40, Table 3.b.

Variable: QPRICE

Variable Title: Physician's Price Index

Sources: 1950-1981 CPI-All; U.S. Bureau of the Census, Statistical Abstract of the United States: 1982-83 (103rd edition). Washington, DC 1983, p. 461, No. 757.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, Historical and Estimated Data for the U.S. Health Sector 1949-1976, p. 57, Table 8.

Table B.2 DATA (cont'd)

1960, 65, 70-81 CPI-P; U.S. Bureau of the Census, *Statistical Abstract of the United States: 1982-83* (103rd edition). Washington, DC 1983, p. 105, No. 157.

Variable: RLQ

Variable Title: Real physician expenditures

Sources: 1950, 55, 60, 65-81; *Health Care Financing Review*, Vol. 4, No. 1, September 1982, p. 25, Table 5.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, *Historical and Estimated Data for the U.S. Health Sector 1949-1976*, p. 36, Tab[illegible] 1.b.

1960, 65, 70-81; CPL-HR U.S. Bureau of the Census, *Statistical Abstract of the United States: 1982-83* (103rd edition). Washington, DC 1983, p. 461, No. 757.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, *Historical and Estimated Data for the U.S. Health Sector 1949-1976*, p. 57, Table 8.

Variable: RLZ

Variable Title: Real hospital care expenditures

Sources: 1950, 55, 60, 65-81; *Health Care Financing Review*, Vol. 4, No. 1, September 1982, p. 24, Table 4.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, *Historical and Estimated Data for the U.S. Health Sector 1949-1976*, p. 40, Table 3.b.

1960, 65, 70-81; CPI-HR U.S. Bureau of the Census, *Statistical Abstract of the United States: 1982-83* (103rd edition). Washington, DC 1983, p. 461, No. 757.

1950-1970 CPI-HS; U.S. Bureau of the Census. *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition, Part 1*, p. 75, Series B262-274, Washington, DC 1975.

Table B.2 DATA (cont'd)

Variable: TPRLQ

Variable Title: Third party expenditures on physicians' services

Sources: 1950, 55, 60, 65-81; Health Care Financing Review, Vol. 4, No. 1, September 1982, p. 24, Table 5.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, Historical and Estimated Data for the U.S. Health Sector 1949-1976, p. 38, Table 2.b.

Variable: TPRLZ

Variable Title: Third party expenditures on hospital care

*Third Party Definition

The category "Third Party" includes all other sources of funding other than direct patient payments. "Third Party" consists of private health insurance expenditures, all public expenditures of the Federal, state and local governments, and expenditures covered by philanthropic support and industrial in-plant services.

Sources: 1950, 55, 60, 65-81; Health Care Financing Review, Vol. 4, No. 1, September 1982, p. 24, Table 5.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, Historical and Estimated Data for the U.S. Health Sector 1949-1976, p. 40, Table 3.b.

Variable: ZPRICE

Variable Title: Hospital price index

Sources: 1950-1981 CPI-All; U.S. Bureau of the Census, Statistical Abstract of the United States: 1982-83 (103rd edition). Washington, DC 1983, p. 461, No. 757.

1971-1981 CPI-HR; U.S. Bureau of the Census, Statistical Abstract of the United States: 1982-83 (103rd edition). Washington, DC 1983, p. 105, No. 157.

Table B.2 DATA (cont'd)

1950-1970 CPI-HS; U.S. Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition*, Part 1, p. 75, Series B 262-274, Washington, DC 1975.

Exogenous Variables

Variable: DMM

Variable Title: Binary variable for Medicare.

Sources: *Health Care Financing Review*, Vol. 4, No. 1, September 1982, p. 11.

Variable: ESP

Variable Title: Economic Stabilization Program

Variable: LTBEDS

Variable Title: Long-term hospital beds

Sources: 1950-70; U.S. Bureau of the Census. *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition*, p. 78, Series B 305-318, B 331-344, and B 413-422.

1971-73; U.S. Bureau of the Census. *Statistical Abstract of the United States 1976* (97th edition), Washington, DC, p. 81, No. 125.

1974-1980; U.S. Bureau of the Census. *Statistical Abstract of the United States 1982-83* (103rd edition), Washington, DC 1983, p. 112, No. 173.

Variable: NGRADLAG

Variable Title: Nurse graduates lagged

Table B.2 DATA (cont'd)

Sources: 1953-1971; U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition, Part 1, p. 75, Series B 275-290. Washington, DC 1975.

*1972-1975; U.S. Bureau of the Census, Statistical Abstract of the United States (97th edition), Washington, DC, p. 77, No. 115.

1976-1980; U.S. Bureau of the Census, Statistical Abstract of the United States: 1982-83 (103rd edition), Washington, DC, p. 197, No. 162.

Variable: PCTQ

Variable Title: Percent of Private Expenditures on Physicians' Services Paid by Private Insurance

Sources: 1977-81; Health Care Financing Review, Vol. 4, No. 1, September 1982, p. 25, Table 5.

1949-76; U.S. Department of Health and Human Services, Historical and Estimated Data for the U.S. Health Sector 1949-1976, p. 38, Table 2.b.

Variable: PCTZ

Variable Title: Percent of private expenditures on hospital care paid by private insurance

Sources: 1950, 55, 60, 65-81; Health Care Financing Review, Vol. 4, No. 1, September 1982, p. 24, Table 5.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, Historical and Estimated Data for the U.S. Health Sector, p. 40, Table 3.b.

Variable: PHYS

Variable Title: Number of physicians

Table B.2 DATA (cont'd)

Sources: 1950-55, 57, 59, 60, 62-70; U.S. Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition*, Part 1, pp. 75-77, Series B 275-290, Washington, DC 1975.

1961; U.S. Bureau of the Census, *Statistical Abstract of the United States 1963* (84th edition), Washington, DC, 1963, p. 74, No. 83.

1971; U.S. Bureau of the Census, *Statistical Abstract of the United States 1974* (95th edition), Washington, DC, p. 73, No. 107.

1972-74; U.S. Bureau of the Census. *Statistical Abstract of the United States 1982-83* (97th edition), Washington, DC, p. 77, No. 155.

1975-1980; U.S. Bureau of the Census, *Statistical Abstract of the United States 1982-83* (103rd edition), Washington, DC, 1983, p. 107.

Variable: POP

Variable Title: Population

Sources: 1950-1969; U.S. Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition*, Part 1, p. 8, Series A 6-8. Washington, DC, 1975.

1970-1983; U.S. Bureau of the Census, *Current Population Reports, Population Estimates and Projections*, Series P-25, No. 939, issued September 1983.

Variable: POP65

Variable Title: Population over 65

Sources: 1950-1970; U.S. Bureau of the Census. *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition*, Part 1, p. 10, Series A29-42. Washington, DC, 1975.

Table B.2 DATA (cont'd)

1971-1979; U.S. Bureau of the Census. Current Population Reports, Population Estimates and Projections, Series P-25, No. 875, issued January 1980.

1980-1982; U.S. Bureau of the Census. Current Population Reports, Population Estimates and Projections, Series P-25, No. 930, issued April 1983.

Variable: RLYD

Variable Title: Real disposable personal income

Sources: 1950-1970 Disposable Personal Income; U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition, Part 1, p. 224, Series F 6-9. Washington, DC, 1975.

1971-1975 Disposable Personal Income; The National Income and Product Accounts of the U.S. 1929-76, Bureau of Economic Analysis, p. 75, Table 2.1.

1976-1981 Disposable Personal Income; Survey of Current Business, p. 37, July 1982, Vol. 4, No. 7.

1950-1981 CPI; U.S. Bureau of the Census, Statistical Abstract of the United States: 1982-83 (103rd edition). Washington, DC, 1983, p. 461, No. 757.

Variable: STBEDS

Variable Title: Short term hospital beds

Sources: 1949-70; U.S. Bureau of the Census. Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition, p. 78, Series B 305-318, B 331-344, and B 413-422.

Table B.2 DATA (cont'd)

1971-73; U.S. Bureau of the Census, Statistical Abstract of the United States 1976 (97th edition), Washington, DC, p. 81, No. 125.

1974-1980; U.S. Bureau of the Census. Statistical Abstract of the United States 1982-83 (103rd edition), Washington, DC, 1983, p. 112, No. 173.

Variable: OOPQ

Variable Title: Out-of-pocket expenditures for physicians' services

Sources: 1950, 55, 60, 65-81; Health Care Financing Review, Vol. 4, No. 1, September 1982, p. 25, Table 5.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, Historical and Estimated Data for the U.S. Health Sector 1949-1976, p. 38, Table 2.b.

Variable: OOPZ

Variable Title: Out-of-pocket expenditures for hospital care

Sources: 1950, 55, 60, 65-81; Health Care Financing Review, Vol. 4, No. 1, September 1982, p. 24, Table 5.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, Historical and Estimated Data for the U.S. Health Sector, p. 40, Table 3.b.

Variable: GOVERNMENT Q

Variable Title: Government expenditures for physicians' revenues

Table B.2 DATA (cont'd)

Sources: 1950, 55, 60, 65-81; *Health Care Financing Review*, Vol. 4, No. 1, September 1982, p. 25, Table 5.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, *Historical and Estimated Data for the U.S. Health Sector 1949-1976*, p. 38, Table 2.b.

Variable: GOVERNMENT Z

Variable Title: Government expenditures in real dollars for hospital care

Sources: 1950, 55, 60, 65-81; *Health Care Financing Review*, Vol. 4, No. 1, September 1982, p. 24, Table 4.

1949, 51-54, 56-59, 61-64; U.S. Department of Human Services, *Historical and Estimated Data for the U.S. Health Sector 1949-1976*, p. 40, Table 3.b.

C.0 MARKET IMPERFECTIONS AND MARKET FAILURE IN THE CONTEXT OF CHANGES IN PHYSICIAN SUPPLY

C.0 Introduction

Two central issues generate governmental intervention interest in health care -- market imperfections and market failures. These two aspects need to be discussed in detail because they will influence the impact of changes in physician supply. The exact influence of these factors is not presently known. We considered some of these aspects in our research. It is clear that one needs to understand these noncompetitive forces to be able to assess and predict the impact of changes in health markets.

C.1 Market Imperfections

In a competitive market system, the laboratory standard for economic efficiency on the demand and on the supply side typically cannot be achieved when the assumptions underlying competitive markets are violated. When these assumptions are not met, we have market imperfections. The most important assumptions that are not fulfilled in the medical area are that consumers have perfect information, that there is complete mobility of resources, and that patients and providers have an incentive to minimize their cost of purchasing and providing medical treatment. Consumers lack information concerning their medical diagnosis, treatment needs, the quality of different providers, and prices charged by different providers. Barriers to mobility of resources exist in restrictions placed on the tasks that various personnel are permitted to perform, entry into health manpower professions, and entry by institutions into various institutional markets are also restricted. The incentives of patients and providers to be concerned with the costs of medical care have been reduced by the purchase of insurance coverage due to the tax deductibility of health insurance premiums, the purchase of such insurance by employers as a nontaxable fringe benefit to their employees, and the reliance on cost-based reimbursement to providers by third party payers, including the government. Many of these problems will be partially resolved by the increasing levels of competition in our model forecasts.

The effect of a lack of price information is empirically evidenced by wide dispersion of prices for a given service and the significantly lower prices in states which permit advertising. Studies show, however, that these purportedly noncompetitive effects can under many conditions be, in fact, considered the results of competitive markets. Our analyses explained why these variations occur and why a clear understanding of competitive market forces erases the misconceptions of the actions and reactions in a competitive market structure.

Examples of the widespread existence of barriers in medical delivery are the continued but falling excess of demands of applicants for medical and dental education. Continued high rates of return for the medical profession and the willingness of prospective students to bear higher costs and study for long periods of time, and even longer periods of time overseas in order to practice as physicians in the United States, are sometimes argued as noncompetitive practices. However, other studies of exactly the same behavior have indicated that these results are in line with competitive markets. We think the returns are still sufficiently rewarding to attract enough students to utilize existing school capacity. This is after considering the impact of future competition. In the institutional sector, lack of consumer information and barriers to entry result in prices exceeding the average cost. For example, Blue Cross was able to use a community rating scheme for many years to price its hospital coverage. Currently, a number of plans still use a modified form of that method called merit rating. Hospitals are able to price their services so as to cross subsidize different services and patients. Their ability to price according to the patient's elasticity of demand, as some believe physicians do, is indicative of a lack of pure competition but evidence of competition as we defined it. Other economists have looked at this question and found that these methods or results are consistent with a workably competitive market; for example, the studies done by Ramsey. Excess insurance for patients and cost-based reimbursement to providers have resulted in inappropriate utilization and a concern for efficiency, excess duplication of facilities and rapidly rising medical costs. All of these factors are forecasted to change, but not radically, by a rapid and substantial increase in physician supply.

The effect of barriers to free information, barriers to entry and barriers to price competition on the economic efficiency of the medical care system means that prices that patients pay for medical care do not equal their marginal valuation of those services. Utilization of medical services by patients when insurance is subsidized either by government or through tax deductions exceeds what they would be willing to pay for that care if they had to pay the full price. Similarly, the price that is paid for medical care by third party payers, the government, and patients both through their out-of-pocket expenditures and through their taxes exceeds the minimum cost of providing that care. Some believe that the level of quality is greater than what patients would be willing to pay for if they were required to pay the full cost of that care. We were not able to investigate the quality issue directly but we believe more quality variation will be one result of competition. Also, the changes we predict will reduce the divergence between price and marginal cost. Issues of the economics of the second best were not continued. However, the effects of taxes were substantial.

Thus, it is apparent that there are imperfections in the market for medical services. Many have been created by the government. To discuss the appropriate role of government in the fact of these imperfections, it is first necessary to explain why these imperfections were originally instituted. One reason for placing restrictions on entry, information, and price competition was to provide consumer protection. Given the technical nature of medical services and the potential harm that may be inflicted upon an uninformed patient by the incompetent provider, the government, working through the health professions, and health institutions place an emphasis on consumer protection. Training requirements in institutions were specified; licensure, which was carried out by the health professions, placed strong restrictions on who was permitted to practice and was responsible for performing medical services. Information on prices, quality, and accessibility was prohibited to prevent unethical providers from misleading the sick. But the very imperfections that prevent medical sectors from performing more efficiently were instituted under government auspices. This fact is important when one considers the objectives of our research to assess the impact of the increase in physician supply in context of the existing regulatory forces.

One of the criteria for competitive efficiency in the demand for service is that consumers will use the service until the price they paid for the last unit of service equals the additional value of the service that they received from it. When the marginal value of the last unit consumed equals the price paid, the consumers are maximizing their utility. Since the price they pay represents foregone utility that could be received from other goods and services, consumers adjust their utilization when prices change so that the marginal value of the last unit equals the new price. Consumers use different quantities of services, even though they face the same prices, because the marginal values to them of the additional units differ. Each consumer, however, is matching the marginal value of the last unit of the foregone good compared to other goods and services. Further, when the consumer is the sole beneficiary of his or her purchases, then it is said that his or her marginal private benefit is equivalent to marginal social benefit. An understanding of the equilibrium achieved through equating the relative utilities to the relative prices is critical to the understanding of how individuals allocate their individual incomes and to how our model works.

If consumers are not assumed to be rational or if persons do not believe that consumer choice should prevail, then the traditional demand curve does not represent marginal social utility. Under such circumstances, traditional economic policy which favors removing imperfections in order to satisfy consumer wants will not achieve the goals of those persons who do not believe that consumer choice and sovereignty are important in determining the amount of medical care to be provided.

Our report explained how those who oppose consumer sovereignty in medical care suggest that the increase in physician supply will impact on the quality of medical care in society. Determination of need, or establishment of health priorities for consumers, which they favor, is difficult to operationalize as can be seen in our discussion of access. Government bureaus would presumably be required to establish resource levels. The criteria such agencies would use or have used for the marginal value placed on allocating these resources (to permit greater utilization or for changing the need by a given percentage) have not been fully developed. However, our studies attempted to clarify these issues. Our synthesis clarified these issues in the context of access to care and explained the issues connected with competitive market forces in the context of alternative value systems. This difference in values regarding whose satisfaction is to be achieved is often reflected in the opposition by some individuals or groups to competition on the supply side. Competition on the supply side among provider groups is based upon the assumption that to survive and grow, suppliers will compete for customers and, in doing so, they will minimize their costs; that is, they will be able to sell their service at a lower price and attempt to provide those services that customers desire. This is very important in the context of forecasted increases in physician supply.

Persons who do not believe that consumers should determine what providers should produce often express similar disbelief in the ability of suppliers to compete with one another without harming patients. In the light of these facts our three studies and synthesis can be interpreted as showing that those arguments are usually based on opinions regarding differences in values. Regardless of differences in values regarding who should determine the quantity and quality of medical services, it was possible to model the impact of changes in physician supply and to show how different delivery systems competed on the supply side. Although there may be distrust of competition to achieve efficiency, allowing such competition to exist and to be an alternative to the more heavily controlled delivery systems could be possible.

This somewhat extended discussion of differences in values that exist in medical care was undertaken because they are likely to be important issues related to how physicians and the government react to increases in physician supply. Much of the criticism of reliance on competition and other market approaches is advanced by people in the medical field and is not based on the market system's ability to achieve the specific economic criteria. Because much of the disagreement is a result of differences in values and unspecified criteria, not about measuring the impact of a policy, the discussion of the role of government in private policy alternatives would be sharpened if these distinctions were more apparent and our work may be helpful in this regard.

C.2 Market Failure

There are certain situations where markets with no imperfections will still not produce the optimal amount of output. In this case, optimality is defined as the situation where the price of the service is equal to its marginal cost. One such situation would be a natural monopoly in the provision of a particular service. In a natural monopoly, the economies of scale are so large that given the size of the market it would be less expensive to have one firm produce all of the service. If competition prevailed, one of the firms would be able to lower their costs by increasing the scale of operations, thereby driving the other firm out of business. In a situation of natural monopoly, competition cannot exist because of the monopoly's pricing strategy. That is, the output is likely to be less than optimal. The situations in which natural monopolies exist in the health field are rare. Relatively good substitutes exist for most medical services at the local level. Economies of scale in hospitals occur in relatively small sized hospitals; individual hospital services such as cobalt therapy units may be subject to relatively large economies. Such services, however, serve a much larger market than is served by the hospital in which they are located. Thus, the market served by such specialized facilities and services is large enough for competition to exist between several of them. Because few services in medical care appear to have the characteristics of a natural monopoly, the natural monopoly argument has not been an important justification for concern in assessing the impact of changes in physician supply. However, some researchers have argued that this is an issue. We did not find evidence of this market failure in our national time-series. However, these may be relevant issues in local market area analysis.

Another possible reason for market failure in medical care is the existence of externalities. Externalities occur when an action undertaken by an individual or firm has secondary effects on others and as a result of those individual actions which may be favorable or unfavorable, the secondary affected individuals are willing to change or must change their allocation decisions. Externalities result in a nonoptimal amount of output being produced, because an individual or firm considers their benefits and costs only when making a production or consumption decision. If costs and benefits are reviewed by others as a result of someone's private decision, then the level of output produced in the market will be based upon either too small a level of benefits, that is, a positive externality, or too small a level of cost, that is, a positive external cost.

A situation where external costs are imposed on others would be similar in approach, although the opposite effect for purposes of determining the optimal level of output. A firm deciding how much output to produce would consider only the marginal private benefits and marginal private costs. It would not take into account any cost imposed by others, such as air pollution.

Individual consumers and producers in a competitive market do not normally take into consideration the external benefits or costs imposed on others as a result of their decisions. When such external costs and benefits are not incorporated into the private decision-making process, then the resultant output is not optimal. Some persons receive benefits for which they would be willing to pay but do not, while others bear additional costs for which they did not receive any benefits. In the former case, the persons purchasing the good or service that results in an external cost are paying a price that is less than the full cost of producing that service. Externalities, therefore, occur in two contexts. The first context is that optimal level of output is determined only when the marginal benefits equal all the marginal social costs. The second context is redistribution; some persons receive an external benefit for which they do not compensate those providing it, or a cost is imposed on them for which they are not reimbursed. To incorporate external costs and benefits into the private decision-making calculus when large numbers of individuals are involved requires some form of collective nonmarket decision making. When large numbers of persons are involved, it becomes difficult to make voluntary arrangements that are satisfactory to all concerned. Group or collective decision making in which all persons must abide by the decision is required to determine both optimal level of output and to whom the compensation is to be paid. It is a legitimate role for government to serve as the group's agent in a nommarket situation such as this. We believe that increasing levels of competition may lead to a reduction in the cross subsidization that currently exists. Other externalities are eliminated or subject to improvement by the increases in competition we predict.

The existence of externalities legitimizes the role of governmental intervention in health care, but what should that role consist of when we have large increases in physician supply? It is important that we take into account the existing research in this area and accurately portray the various alternatives that are available under various competitive market structures. It is not sufficient to merely claim that externalities exist and then to accept research findings that all types of government action in financing of health care or medical care are appropriate in face of an increase in medical practitioners. The proper role of government is two-fold. First, it must determine the exact nature and size of the external benefits and costs if externalities are believed to exist. The measurement of externalities is a difficult task, both conceptually and empirically as will be discussed below. Nonmarket studies, referred to as cost-benefit analyses, are important for determining the optimal level of output in situations where externalities exist. A problem with benefit-cost studies that have been undertaken in the health field is that they suggest it is appropriate for government to undertake any program that has favorable cost-benefit ratios. To the extent possible, our approach incorporated these considerations into our analysis. The synthesis, in fact, took them into account. Relations like these, or the effect of competitive market forces and structures, were part of the existing health care system our model captures. If they would have been omitted, we would not have been able to understand the impact of changes in physician supply in the context of existing regulatory behavior.

The second role of government when externalities exist is to determine how the externalities should be financed, that is, who should be compensated and who should be taxed. It was important that our model took these factors into account too. That is why we included the tax system and the government programs. Situations involving externalities do not necessarily require government production or provision of particular services. If a particular service does not have the characteristic of being a natural monopoly, then there is no reason why there could not be competition in the provision of that service. Medical schools and other research institutions could compete. This may be one result of the changes in physician supply. The criterion for whether the service should be governmentally provided or privately provided should be efficiency; there is nothing inherent in the nature of externalities that suggests services should or will be publicly provided as a result of a structural shift in physician supply. We found little evidence of interest to expand the level of government in actual provision of services.

Several types of situations in health and medical fields give rise to externalities. One type is referred to as the consumer protection argument, which was discussed previously. Another externality with regard to personal medical services is what may be referred to as externalities in consumption. If healthier and wealthier individuals do not want to see persons less fortunate than themselves go without the necessary medical care and are willing to contribute to those individuals' medical care, then an externality in consumption is said to exist. This is because the utility of individuals depends not only upon the quantity of goods or services they consume themselves, but also upon the amount of certain goods and services such as medical care that are purchased by others. Under these circumstances, if one person contributes to the medical care and services of the less fortunate, then other individuals who would have done so themselves, receive an external benefit even though these other individuals did not necessarily contribute. Noneconomic research indicates that these externalities need to be considered. As competition extends the access to care to more people, those in undeserved areas will have a strong argument for a limited but clearly defined public program to meet their needs.

In another area, the justification for national health services and other forms of in-kind substitutes is presumably based on the assumption that there are externalities in consumption. Otherwise, the proposed in-kind subsidies would not be efficient. New entrants into the industry may advocate such programs in response to restricted employment opportunities. If the objective of the subsidies were the redistribution of income, then direct cash supplements would achieve the same objective and would be more efficient. The recipients of the subsidy would always prefer cash, which could be used for any one of their economic needs. In this case, it may be that medical care does not represent their highest priority. For in-kind subsidy to be efficient, therefore, the intent must be to satisfy the preferences of the government or the donor rather than the recipients. When an in-kind subsidy is called for, as in the case of externalities and consumption, then the type of person that donors are willing to subsidize and the amount of the subsidy to be provided to each of these individuals are probably inversely related to the individual's income. The lower the recipient's income, the greater the donor's willingness to provide the subsidy. It is unlikely that the person or the general taxpayer will receive an external benefit from seeing a person with possibly higher income than his own receive a subsidy. These aspects of in-kind subsidy should be kept in mind when national health insurance or other kinds of insurance subsidies are considered. However, the increases in physician supply may generate a whole new group of advocates for the establishment of National Health insurance.

Then, finally, there is a third type of externality that occurs in the health field and is usually associated with public health programs rather than personal medical services. Vaccination programs, clear and clean water supplies, air pollution abatement, and medical research are examples of goods that result in large external benefits.

It has generally been argued that with respect to these types of programs, a great many cost-benefit studies have been undertaken to show either their benefits, their net benefits, or net costs. Increased competition is unlikely to effect these issues directly. However, as costs of health are stabilized the medical cost of achieving these goals will be lower than they would be otherwise.

C.3 Redistribution Using In-Kind Subsidies

There are many types of in-kind subsidies in medical care. Some of these are demand subsidies; others are supply subsidies. Some are indirect with regard to the beneficiary groups they hope to affect, and others are direct. National health insurance would be classified as a direct demand subsidy. Before discussing national health insurance, it would be important to consider how different kinds of subsidies in medical care, their magnitude and their possible effects and their probable beneficiaries, would be important to our synthesis and choice of the relevant literature. Before discussing insurance, it would be instructive first to discuss the various types of in-kind subsidies in medical care, their magnitude, and their probable effects and beneficiaries. During the development of our research, we gained a better understanding of in-kind subsidies and how they might be influenced by changes in physician supply.

The major in-kind subsidies on the demand side are Medicare and Medicaid. Medicare, which is a federally funded program to provide medical care to the aged, and Medicaid, which is a federal-state matching program for low income and medically indigent families, are two of the largest federal programs. Expenditure on these programs and other direct subsidies on the demand side such as Maternal and Child Care, have been some of the fastest growing programs in the country. The other demand side subsidies are indirect, that is, there is a tax deductibility of one-half of the health insurance premiums up to a maximum of $150 and a tax deductibility of medical expenses in excess of three percent of the adjusted gross income, and the provision of employer paid health insurance premiums as a fringe benefit which are excluded from the employees' taxable income (note: modifications have been made for the 1983 tax year).

On the supply side, there have been subsidy programs for health manpower education, both at the federal and state levels, federal subsidies for hospital consumption, and federal and state provision for medical services to the Veterans Administration in state and local government hospitals. These have been mentioned as causal factors in the current expansion of medical graduates. There are also numerous indirect supply subsidies, for example, which grant tax exempt status to nonprofit providers such as nonprofit hospitals and Blue Cross/Blue Shield plans, and state assistance in financing hospital bond issues. Changes in these programs have influences on and are in turn influenced by changes in physician supply.

Given the current significant role of the government in personal medical services, it is important to determine the interaction between these programs and physician supply. These factors influence the cost and access to medical care and how physicians react to changes in physician supply. These two issues are interrelated. As previously discussed, the argument for in-kind subsidy is based upon externalities and consumption. As such, the primary beneficiaries should be those persons with low incomes and/or poor health. If the subsidies are distributed in such a way as to benefit higher income groups or to provide them with greater proportionate shares of the subsidy, then the distribution of the subsidy is inefficient. That is, the desired beneficiary group, low income people, could receive a greater amount of the subsidy if it were provided in a different and presumably more direct manner. When future studies are done comparing these government programs to the results we predict to occur under competitive systems, these considerations have to be included. As competition develops we will see the extent to which these are important to public policy debate.

Supply subsidies in medical care have generally been direct in their impact on low income persons when the government itself has served as the supplier. When supply subsidies have been indirect, in-kind subsidies have provided benefits to all those persons who use the medical services, but, as with the Hill-Burton program for hospital construction, nothing was done to help those who could not afford to use the hospital. A demand subsidy was still required for the medically indigent. In-kind supply subsidies take longer than direct demand subsidies to provide greater access to medical services to the beneficiary group. They are also economically inefficient, either because patients have no choice as to which provider they must go to, as in the VA system, or because the relative cost of inputs is distorted. Finally, the benefits of indirect supply subsidies are overstated since employee participation rates and productivity increases are, in fact, likely to be lower than what they would otherwise have been. It is important to consider these elements in the analysis of the action and reaction by physicians and governmental agencies. Part of these considerations have been modeled. Others can be inferred from the model and economic theory.

The intent of the preceding discussion on existing in-kind subsidies in medical care is to provide both an indication of how our research has approached the current situation in these matters, but also to indicate the possible relation between market action, reaction and market imperfections. One can see that to understand the possible impacts of increases in physician supply, one must know the reasons for governmental intervention. In this way, our research can determine the extent to which market imperfections, market failures, or redistribution policy can be altered by changes in physician supply. It is also necessary to synthesize the research findings in the context of comparing actual operating health care markets under workable competition and actual operating health care markets under existing or likely regulatory regimes. Our results provides the basis for that comparison.